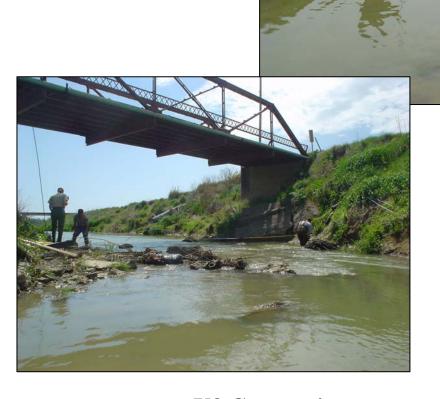
VANDERBURGH COUNTY SOIL AND WATER CONSERVATION DISTRICT

BARR CREEK WATERSHED POST-CONSTRUCTION MONITORING STUDY



V3 Companies November 2005

BARR CREEK WATERSHED POST CONSTRUCTION MONITORING STUDY

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1.0 EXECUTIVE SUMMARY

V3 Companies, Ltd (V3) has conducted the Barr Creek Watershed Post-Construction Monitoring Study for the Vanderburgh County Soil and Water Conservation District (SWCD). There are five sampling stations for evaluating macroinvertebrate communities, habitat and water quality parameters. This includes two stations on Barr Creek, two stations on Big Creek, and the reference station on Rush Creek. This study follows the guidelines suggested by the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) Program. This study was funded by the IDNR's LARE program. Only Stations 2 and 3 are along Barr Creek. Stations 2, 3 and 5 are downstream of the watershed drainage area's which had land use best management conservation practices implemented.

Land use best management conservation practices were implemented by the Vanderburgh and Posey County SWCDs to improve the Barr Creek watershed from 1993 through 1998. The land use best management conservation practices included: no-till conservation tillage, stormwater runoff diversions, cool season grass filter strips, pipe structure grade stabilization structures, a poured concrete toewall grade stabilization structure, rock rip-rap grade stabilization structures, newly created grass waterways, repaired grassed waterways, integrated crop management, pasture and hayland plantings, rock rip-rap streambank protection, tree plantings, waste management containment systems, and water and sediment control basins.

The 1994 Rapid Bioassessment of the Barr Creek and Big Creek Watersheds Using Benthic Macroinvertebrates attempted to establish baseline information within the watershed. V3 performed the 2004 post-land use treatment improvements evaluation in an attempt to evaluate the effectiveness of the land use best management conservation practices. V3 has made the best possible comparisons in the resulting data between the 2004 Barr Creek Watershed Final Water Quality Monitoring Study and the 1994 study. Macroinvertebrate monitoring and habitat evaluations were conducted using the methods provided by the U.S. Environmental Protection Agency. Habitat was also evaluated by using the Qualitative Habitat Evaluation Index (QHEI). Water quality measurements were taken in the field with water quality meters.

The comparative interpretation between the 1994 and 2004 water chemistry data was limited due to the differences in sampling seasons and limited water quality parameters. Variation in water temperature affects the other water quality measurements. Water temperature readings from summer 1994 were as high as 97°F in Barr Creek and 95°F in Big Creek. The USEPA STORET database from station #03378550, near Wadesville on Big Creek, approximately five miles downstream of Station 5, lists mean water temperature at 50°F and the upper 85th percentile as 72°F. If field measurements of water temperature from 1994 were accurate, it is representative of an extreme condition and should have been cause enough for re-scheduling the sampling effort. It was concluded that attempting to duplicate the 1994 sampling seasons was not in the best interest of meaningful water quality results. V3 performed the 2004 study abiding by the suggested spring and fall sampling seasons as a result of discussions with the IDNR and the Vanderburgh County SWCD. Regrettably, the LARE office was not consulted in this determination. It is important to collect post-treatment samples as close as possible to the dates of when the pre-treatment survey was completed (IDNR, 2005). However, local IDNR staff believed that flowing water may not occur in Barr Creek during summer and winter months.

The habitat comparison between the 1994 and 2004 studies demonstrated that habitat at the two Big Creek stations and the furthest downstream station on Barr Creek degradation from regional expectation, as represented by the reference stations. The qualitative assessment which most significantly contributed the quantitative value representing degradation within the Habitat evaluation parameters is: Bottom Substrate/Available Cover; Pool/Riffle, Run/Bend Ratio; and Channel Alteration. All three of these stations have unstable silt bottoms, very poor representation of riffles, and are significantly channelized.

The biological evaluation of macroinvertebrate communities from 1994 and 2004 involved discrepancies in sampling protocols and sampling seasons. The ability to make valid comparisons between the 1994 and 2004 studies is compromised by the use of inconsistent field methods. V3 followed the multihabitat approach provided in the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish, Second Edition, publication number EPA 841-B-99-002. The 1994 survey and the preference of the LARE program is to follow the single habitat approach as described within the above mentioned USEPA publication or the RBPIII protocol as it is described in the USEPA Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, publication number EPA/440/4-89/001. It is important for subsequent evaluations and comparisons to be aware of these data collection differences.

The comparison between the study results from the summer shortly after to the spring more than ten years after the land use best management conservation practices were implemented show an improved biological condition at Station 2 on Barr Creek (Slight to None) and at Stations 4 and 5 on Big Creek (Moderate to Slight). Comparison between the winter shortly after to the fall more than ten years after show an improved biological condition at Station 2, where the rating improved from Slight Impairment to No Impairment. All other impairment category ranking remained unchanged.

The interpretation of biological impairment levels as they relate to the regional achievable potential represented by comparison with the reference station has limitations. The 1994 and 2004 studies lack a consistence in sampling season and sampling methodology. This limits an interpretiation of the data as to whether the land use best management conservation practices demonstrated an improvement within the watershed. Rating of the sampling stations in comparison to the reference stations, the conditions of the macroinvertebrate communities either remains constant or it improves from 1994 to 2004. Without an improved condition correlation in habitat or water quality to add support to the improved condition in the interpretation of the macroinvertebrate communities, the confidence in a statement of the health of the watershed having demonstrated improvements is unsupported.

The benthic macroinvertebrate impairment categories by sampling stations through a comparison of 1994 to the 1994 reference station and 2004 sampling stations to the corresponding 2004 reference station either remained the same or showed improvements. Three of the four sampling stations from 1994 to 2004 demonstrated a degraded habitat condition. This report concludes that the measures taken to install no-till conservation tillage, stormwater runoff diversions, cool season grass filter strips, pipe structure grade stabilization structures, a poured concrete toewall grade stabilization structure, rock rip-rap grade stabilization structures, newly created grass waterways, repaired grassed waterways, integrated crop management, pasture and hayland plantings, rock rip-rap streambank protection, tree plantings, waste management containment

systems, and water and sediment control basins may have been effective in improving the quality of some attributes within the Barr Creek watershed. The habitats of Barr and Big Creeks require additional attention.

Land use best management conservation practices have been implemented within the 10,000 acres of Barr Creek's watershed. We recommend the continued implementation of habitat focused watershed improvement measures within Barr Creek's watershed, especially within the portions of Posey County. We recommend that similar measures in the upstream rural and agricultural areas of the 40,000 acres of Big Creek's watershed be implemented. Complications may arise as Big Creek's watershed spans Posey, Gibson and Vanderburgh counties, however, the improvements in Barr Creek demonstrate the validity of implementing best management land use conservation practices.

2.0 ACKNOWLEDGEMENTS

V3 would like to acknowledge the contributions the Vanderburgh and Posey County SWCD's for implementing the land use best management conservation practices. We would like to acknowledge Amy Steeples and Ronnie Boehm (both with IDNR at the time of V3's survey) for their assistance with historical data collection and field sampling efforts. We would also like to acknowledge Cecil Rich (IDNR, LARE Program Biologist) for his review and comments.

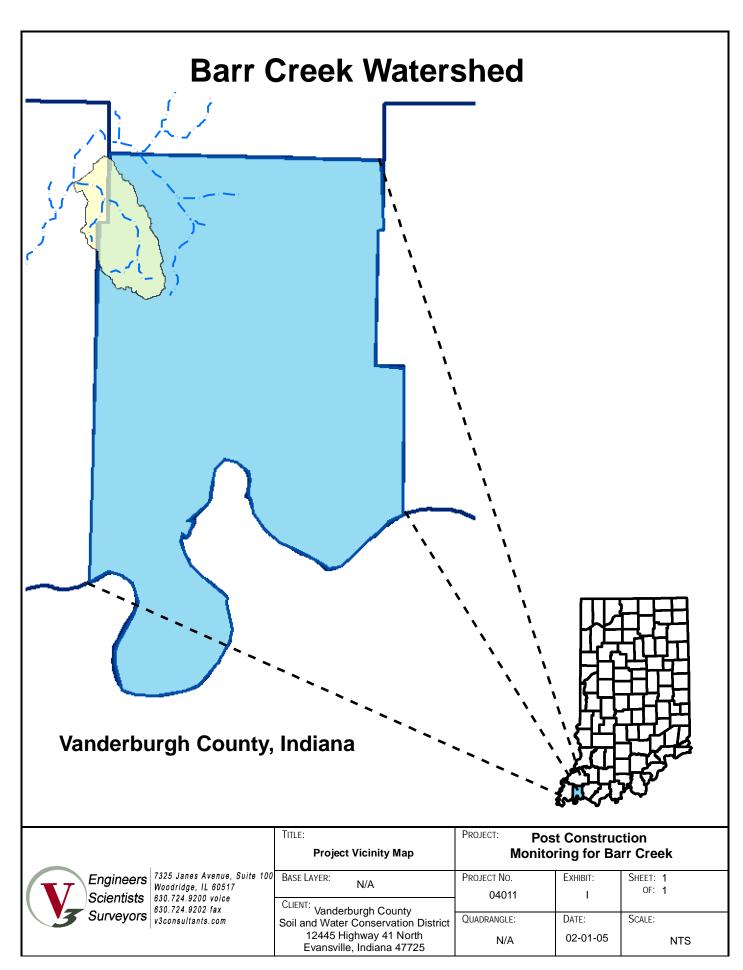
3.0 INTRODUCTION

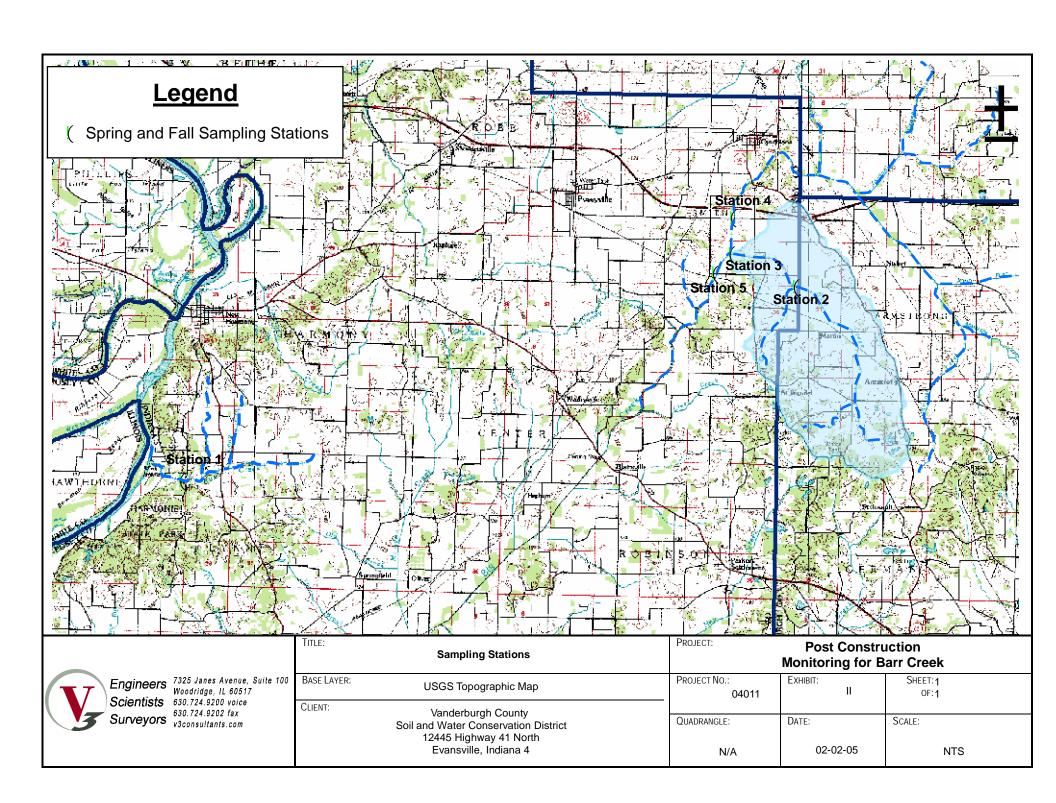
V3 has provided technical services to the Vanderburgh County SWCD in conducting the Barr Creek Watershed Post-Construction Monitoring Study in Vanderburgh and Posey Counties, Indiana. The Vanderburgh County SWCD has performed several land use conservation practices throughout the watershed to improve water quality conditions. Comparisons are valuable between the pre-treatment and post-treatment studies to evaluate the effectiveness of the land use conservation practices that were implemented. The majority of the 8,998.6 acre Barr Creek watershed (see Exhibit I) is within Vanderburgh County, with the downstream most northwest portions extending into Posey County. Rush Creek, in Posey County, was used as a reference steam in the comparative analysis of this study. The comparison of sampling stations to the reference station negates a negative climatic event's impact to the station (such as draught) from invalidating the sampling effort, as the reference station is exposed to the same climate. The reference station represents what the sampling station achievable potential. This study follows the guidelines suggested by the IDNR LARE Program. The LARE program provided the funding to carry out the post-treatment monitoring study.

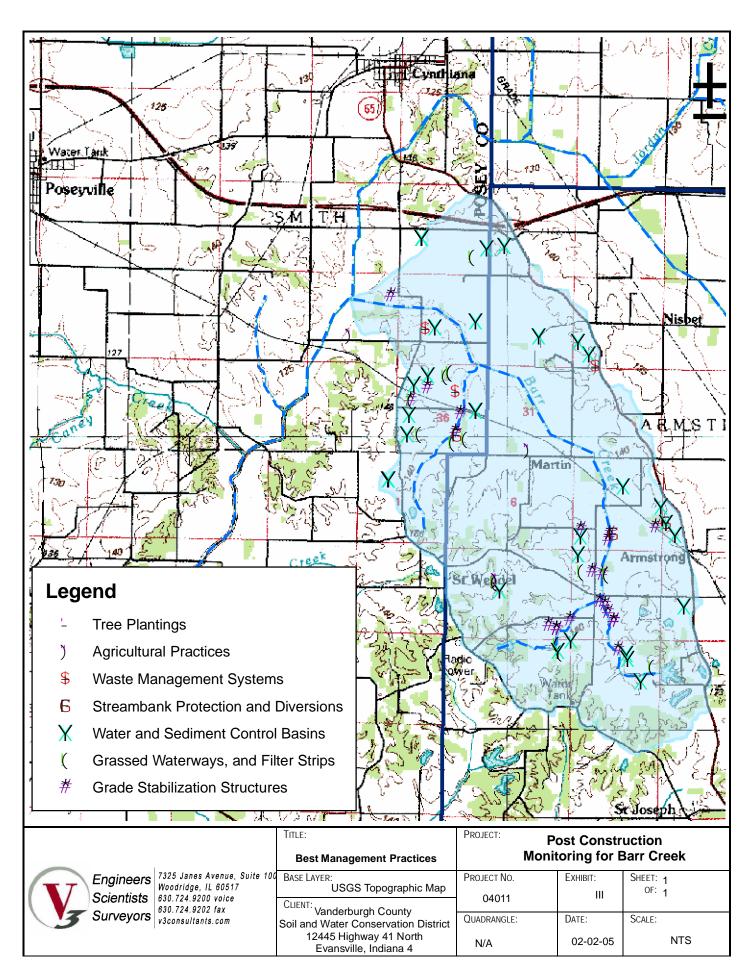
There are five identified sampling stations that were monitored in the spring (mid-April to mid-May) and in the fall (mid-September to mid-October). Station 1 is the reference site and is located on Rush Creek, in Posey County. Sampling Stations 2 and 3 are within the Barr Creek watershed located in both Vanderburgh and Posey Counties. Stations 4 and 5 are within the Big Creek watershed located in Posey County. All sampling stations are shown on Exhibit II.

The Vanderburgh County SWCD has performed several land use conservation practices throughout the watershed to improve water quality conditions. Measurements of the proportions of land using conservation tillage practices were not available for comparison throughout the years since the previous monitoring study was conducted. Locations of Barr Creek's best management practices are shown in Exhibit III and include the following:

- 38.2 acres of no-till Conservation Tillage
- 2.250 linear feet of Diversion
- 1.5 acres of cool season grass Filter Strips
- 17 facilities with pipe structure Grade Stabilizations
- 1 facility with poured concrete toewall Grade Stabilization
- 5 facilities with rock rip-rap Grade Stabilizations
- 11,110 linear feet of Grassed Waterways
- 1,000 linear feet of Grassed Waterway repair
- 38.2 acres of Integrated Crop Management
- 15.5 acres of Pasture and Hayland Planting
- 326 linear feet of rock rip-rap Streambank Protection
- 0.5 acres of Tree Planting
- 4 facilities with Waste Management Containment Systems
- 107 facilities with Water and Sediment Control Basins







In 2004, V3 performed the Post-Construction Monitoring Study in accordance with the guidelines suggested by the IDNR LARE Program. V3 also performed the spring and fall sampling efforts within the LARE Program's designated timeframes, and as a direct result from discussions with regional IDNR staff and Vanderburgh County SWCD employees. However, the study performed in 1994 did not perform sampling during these seasonal time frames, as the spring sampling (mid-April to mid-May) was performed in July, and the fall sampling (mid-September to mid-October) was performed in December. This seasonal sampling discrepancy will cause potential distortions within the comparative analysis. Performing the postconstruction monitoring during the months of July and December would have allowed for more direct comparisons, however, it was the opinion of local professionals from the IDNR and SWCD that Barr Creek may not have flowing water during the summer and winter months in 2004. A decision was made to abide by the spring and fall sampling seasons for the reasons of having surface water within Barr Creek and to establish a 2004 data set within the prescribed sampling seasons for future comparisons. Admittedly, the drawback to this decision makes it difficult to perform direct comparisons between the 1994 study and the 2004 study.

The Barr Creek watershed is in a predominantly rural agricultural and is approximately 8,998.6 acres. Barr Creek terminates at it's confluence with Big Creek. The 14-digit hydrologic unit code (HUC) for the Barr Creek subwatershed is 05120113110050. Big Creek was sampled in two different, but adjacent, subwatersheds. Station 4 is located on Big Creek upstream of the confluence with Barr Creek. The 14-digit HUC number for the upstream subwatershed on Big Creek is 05120113110040. Station 5 is located on Big Creek and is downstream of the confluence with Barr Creek. The 14-digit HUC number for the downstream subwatershed on Big Creek is 05120113110070. There are two sampling stations along Barr Creek (Stations 2 and 3) and two sampling stations along Big Creek (Stations 4 and 5). Station 3 was measured to be 285 feet upstream of the confluence between Barr and Big Creeks during the spring 2004 sampling effort. The 14-digit HUC number for the reference location on Rush Creek is 05120113100030. All of the studies sampling stations are described in Table 1, and shown in Exhibit II.

TABLE 1 –BARR CREEK WATERSHED, SAMPLING STATIONS

| | Waterway | Location | Sampling | Watershed |
|-----------|------------|------------------------|--------------|--------------|
| | | | Season | Area (acres) |
| Station 1 | Rush Creek | Harmonie State Park | Both Seasons | 5,900 |
| Station 2 | Barr Creek | County Line Road | Both Seasons | 6,200 |
| Station 3 | Barr Creek | Upstream of Confluence | Both Seasons | 10,000 |
| | | w/Big Creek | | |
| Station 4 | Big Creek | Water Tank Road | Both Seasons | 39,900 |
| Station 5 | Big Creek | Emge Road | Both Seasons | 50,000 |

All of the stations were selected to provide interpretive data on the respective portions of the watershed. Station 1 is the off-site reference location and is located within the Harmonie State Park. Station 1 is intended to have a desirable stream condition that can represent what Barr and Big Creek's achievable potential with respect to biological, physical and chemical characteristics. The reference station (Station 1) is located on Rush Creek and has a similar upstream drainage area as the furthest upstream station on Barr Creek (Station 2). Station 2, 3 and 5 receive the watershed drainage within the areas where the land use best management conservation practices have been implemented. Station 4 acts as a benchmark, as none of the implemented land use best management conservation practices are within its watershed. Station 5 does not encompass much additional watershed area (100 acres), however, it does represent the blending of waters from both Barr and Big Creeks. Potential impacts occurring at Station 5 would be shown to be from outside of the Barr Creek watershed if similar impacts were recorded at Station 4.

4.0 METHODS

4.1 Biological Evaluation Methods

Macroinvertebrate monitoring followed the USEPA's Benthic Macroinvertebrate Protocol for the multihabitat approach. The multihabitat approach involves the systematic collection of benthic macroinvertebrates from all available instream habitats by kicking the substrate or jabbing with a dip net. A total of 20 jabs or kicks are taken from all major habitat types in the reach resulting in sampling approximately 3.1 m² of habitat. The collected organisms are sorted in the V3 laboratory and identified to the lowest practical taxon. The collection procedure provides representative macroinvertebrate fauna from all of the available instream habitats including riffle and run habitat types that provide representatives of scraper and filterer functional feeding groups, and Course Particulate Organic Matter (CPOM) such as detritus, leaves and sticks that provide representatives of the shredder functional feeding group.

Although the multihabitat approach is provided in the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish, Second Edition, publication number EPA 841-B-99-002, the LARE program would have preferred that the study had followed the single habitat approach as described within that same publication or the RBPIII protocol as it is described in the USEPA Rapid Bioassessment Protocols for Use in Streams and Rivers, Benthic Macroinvertebrates and Fish, publication number EPA/440/4-89/001. The data from survey of the benthic macroinvertebrate community shortly after the implementation of the land use conservation practices would have been more readily compared to the data from this survey had the methodology been the same.

4.2 Physical Evaluation Methods

Habitat evaluation followed both the USEPA rapid and qualitative habitat assessment approach and the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) habitat assessment approach. Neither of these evaluation methods were readily comparable to the 1994 study, however, they are made available in this study for future comparisons.

4.3 Chemical Evaluation Methods

Water quality analysis was measured in the field using an In-Situ Multi Parameter TROLL 9000, YSI Model 50B Dissolved Oxygen Meter, LaMotte 2020 Turbidimeter, and MARSH-McBIRNEY FLO-MATE Model 2000 Portable Flowmeter. V3 performed the water quality measurements for the following parameters: oxidation-reduction potential, temperature, conductivity, pH, dissolved oxygen, flow and turbidity. V3 did not collect water samples for water chemistry analysis in a laboratory as the previous investigation did not perform these analysis and the results would not have been able to be compared.

5.0 RESULTS

IDEM was contacted to collect available information from the Barr Creek watershed on water chemistry, fish tissue, fish communities and benthic macroinvertebrate communities. No information was available from the Barr Creek watershed (IDEM 2005a through 2005d).

5.1 Biological Evaluation Results

Appendix I contains the field and laboratory data sheets for the benthic macroinvertebrate communities. Appendix II contains the transmittal letter and photo-documentation from V3 to Purdue University, Department of Entomology which accompanied the thirty seven (37) voucher specimens of macroinvertebrates collected during the 2004 study, as well as the response letter from Dr. Arwin Provonsha of Purdue stating that all 37 macroinvertebrates are accurately identified. Table 2 lists the macroinvertebrates that were collected during the April 2004 sampling event at each of the five stations. Table 3 lists the macroinvertebrates that were collected during the October 2004 sampling event at each of the five stations.

Table 4 presents the spring assessment results for macroinvertebrates from both 1994 and 2004. Table 5 presents the fall macroinvertebrate data in the same way. In situations where parameters have shown an improvement from the baseline study, yellow shading has been added to the cells.

TABLE 2 – BENTHIC MACROINVERTEBRATE COLLECTED BY STATION, APRIL 2004

| | - DENTHIC MACK | | | | | STATIONS | | |
|----------------|-----------------------|--------------|----------|----|----------|----------|----|----|
| ORDER | FAMILY | GENUS | SPECIES | 1 | 2 | 3 | 4 | 5 |
| Nematomorpha | | | | • | | - | 7 | 4 |
| Hydracarina- | | | | | | | | 7 |
| Trombidiformes | | | | | | | | 1 |
| Tubellaria | Planaria | | | 3 | 3 | | 3 | |
| Pelecypoda | Corbiculidae | Corbicula | fluminea | | | 3 | 9 | |
| | Sphaeriidae | | | 17 | 6 | | | |
| Gastropoda | Lymnaeidae | | | 1 | | | | |
| | Physidae | | | 1 | 4 | 2 | 1 | 2 |
| | Planorbidae | | | | | | 1 | |
| Annelida | Hirudinea | | | 3 | | | | |
| | Oligochaeta | | | 4 | 6 | 1 | 12 | 3 |
| Decapoda | 3 | | | | 1 | 1 | | |
| Amphipoda | | | | 25 | 10 | 9 | 1 | 4 |
| Isopoda | Asellidae | | | | 5 | 1 | 2 | |
| Ephemeroptera | Caenidae | Caenis | | 1 | 1 | 1 | 2 | 1 |
| | Baetidae | Baetis | | 1 | 1 | | 4 | 18 |
| | Heptageniidae | Stenacron | | 1 | 1 | 1 | | |
| Coleoptera | Dytiscidae | | | | | | 1 | |
| | Haliplidae | | | | 17 | 1 | 8 | |
| | Elmidae | | | | 1 | | | 4 |
| | Hydrophiloidae | Tropisternus | | | 1 | | | |
| Trichoptera | Hydropsychidae | ' | | 4 | | | 3 | 1 |
| Hemiptera | Gerridae | | | 1 | 1 | | | |
| Odonata- | | | | | | | | |
| Anisoptera | Corduliidae | | | | 4 | 9 | 1 | 1 |
| Odonata- | | | | _ | | | | _ |
| Zygoptera | Calopterygidae | Calopteryx | | 2 | | | 14 | 5 |
| | Coenagrionidae | | | 2 | 4 | | 6 | 7 |
| | Coenagrionidae | Argia | | 2 | | 1 | | |
| | Coenagrionidae | Engallagma | | | | 4 | | |
| Dintoro | Blood-red | | | 15 | 24 | 10 | | _ |
| Diptera | Chironomidae Other | | | 15 | 24 | 18 | 9 | 5 |
| | Chironomidae | | | 11 | 6 | 36 | 21 | 38 |
| | Simuliidae | | | 3 | 2 | 12 | 2 | 6 |
| | Tipulidae | | | 3 | 1 | | | |
| | Tabanidae | | | | 1 | | | |
| | Labanidae | I | | 1 | <u> </u> | <u> </u> | | l |

TABLE 3 – BENTHIC MACROINVERTEBRATE COLLECTED BY STATION, OCTOBER 2004

| | FAMILY | | | | | TATIO | | |
|---------------|-----------------------|--------------|----------|----|----|-------|----|--|
| ORDER | FAMILY | GENUS | SPECIES | 1 | 2 | 3 | 4 | 5 |
| Nematomorpha | | | | | | 3 | | |
| Tubellaria | Planaria | | | | | 3 | 1 | 2 |
| Pelecypoda | Corbiculidae | Corbicula | fluminea | | 7 | | 6 | 2 |
| | Sphaeriidae | | | 6 | | | | |
| Gastropoda | Lymnaeidae | | | 1 | | | 1 | 6 |
| | Physidae | | | | 13 | 15 | 1 | 3 |
| Annelida | Hirudinea | | | 1 | | | | 1 |
| | Oligochaeta | | | | 23 | | 10 | 4 |
| Amphipoda | | | | 3 | 2 | | | |
| Isopoda | Asellidae | | | 2 | | | | |
| Ephemeroptera | Caenidae | Caenis | | | | | 3 | 5 |
| ' | Baetidae | Baetis | | 12 | 4 | 7 | | |
| Coleoptera | Dytiscidae | | | | | | 2 | 4 |
| ' | Gyrinidae | | | | | 3 | | 2 |
| | Gyrinidae | Dineutus | | | | 1 | | |
| | Haliplidae | | | | 1 | | 3 | 2 |
| | Elmidae | | | | 8 | 4 | | 9 |
| | Hydrophiloidae | Tropisternus | | | 1 | 9 | | |
| Trichoptera | Hydropsychidae | ' | | 13 | | | | |
| Hemiptera | Belostomatidae | | | | | | | 1 |
| | Corixidae | | | | 1 | 3 | | 3 |
| | Gerridae | | | | | | 5 | 2 |
| Odonata- | | | | | | | | |
| Anisoptera | Corduliidae | | | | 5 | 6 | 1 | |
| Odonata- | | | | | | | | |
| Zygoptera | Calopterygidae | Calopteryx | | 2 | | | | |
| | Coenagrionidae | | | | | 34 | | 14 |
| | Coenagrionidae | Argia | | | 16 | | 14 | 2 |
| | Coenagrionidae | Engallagma | | 3 | 14 | | | 10 |
| 5 . | Blood-red | | | | | | | |
| Diptera | Chironomidae | | | 3 | 3 | 1 | 27 | 13 |
| | Other Chironomidae | | | 8 | | 6 | 22 | 15 |
| | Culicidae | | | 1 | 2 | 2 | 4 | 10 |
| | Simuliidae | | | 33 | | | 4 | \vdash |
| | Tipulidae | | | 12 | | 3 | - | |
| | Принаае | | | 12 | | 3 | | |

TABLE 4 – BENTHIC MACROINVERTEBRATE RESULTS, JULY 1994 AND APRIL 2004

| Parameter | Stati | on 1 | Stati | ion 2 | Stati | on 3 | Stati | ion 4 | Stati | ion 5 |
|--|-------|------------------|-------|------------------|-------|------------------|-------|------------------|-------|------------------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Total Number of Taxa | 16 | <mark>19</mark> | 14 | <mark>21</mark> | 12 | <mark>15</mark> | 12 | <mark>18</mark> | 11 | <mark>15</mark> |
| Total Number of EPT Taxa | 3 | 4 | 3 | 3 | 2 | 2 | 4 | 3 | 3 | 3 |
| Percent Contribution of Dominant Taxa | 24 | 25 | 54 | <mark>24</mark> | 59 | <mark>36</mark> | 32 | 21 | 41 | 38 |
| Ratio of EPT/Chironomidae | 1.7 | 0.27 | 8.9 | 0.1 | 1.6 | 0.1 | 0.6 | 0.3 | 0.07 | 0.47 |
| Modified Biotic Index | 6.9 | <mark>5.9</mark> | 7.3 | <mark>6.6</mark> | 8.4 | <mark>6.2</mark> | 7.4 | <mark>5.4</mark> | 7.3 | <mark>5.2</mark> |
| Ratio of Scraper/Filterer | 0.9 | 0.13 | 0.3 | 0.63 | 10 | 0.2 | 0.13 | 0.14 | 1.5 | 0.29 |
| Ratio of Shredder/Nonshredder | 14 | 0.25 | 0 | 0.15 | 0 | 0.1 | 0 | 0.03 | 0 | 0.04 |
| Community Similarity - Community Loss | 0.0 | 0.0 | 0.3 | 0.24 | 0.7 | 0.67 | 0.5 | 0.39 | 0.4 | 0.47 |
| Community Similarity - Jaccard Coefficient | - | 1 | 1 | 0.54 | - | 0.36 | - | 0.48 | - | 0.48 |
| Number of Individuals Evaluated | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Cells that are shaded yellow have improved from 1994 to 2004.

TABLE 5 – BENTHIC MACROINVERTEBRATE RESULTS, DECEMBER 1994 AND OCTOBER 2004

| Parameter Parameter | Stati | | | ion 2 | | ion 3 | 1 | ion 4 | 1 | on 5 |
|--|-------|------------------|------|-----------------|------|-----------------|------|------------------|------|------------------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Total Number of Taxa | 16 | 14 | 9 | <mark>14</mark> | 15 | 15 | 16 | 14 | 17 | <mark>19</mark> |
| Total Number of EPT Taxa | 6 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| Percent Contribution of Dominant Taxa | 49 | <mark>33</mark> | 73 | 23 | 57 | <mark>34</mark> | 23 | 27 | 18 | 15 |
| Ratio of EPT/Chironomidae | 2.2 | 2.27 | 18 | 1.33 | 5.7 | 1.00 | 6.0 | 0.06 | 0.54 | 0.18 |
| Modified Biotic Index | 7.3 | <mark>5.3</mark> | 4.3 | 6.2 | 4.9 | 6.0 | 6.9 | <mark>6.3</mark> | 7.4 | <mark>6.4</mark> |
| Ratio of Scraper/Filterer | 0.13 | 0.02 | 0.5 | 1.86 | 2.0 | 15/0 | 0.06 | 0.33 | 0.5 | 4.5 |
| Ratio of Shredder/Nonshredder | 69 | 0.05 | 84 | 0.04 | 58 | 0.02 | 0 | 0.04 | 6 | 0 |
| Community Similarity - Community Loss | 0.0 | 0.0 | 1.1 | 0.64 | 0.5 | 0.6 | 0.4 | 0.71 | 0.5 | 0.47 |
| Community Similarity - Jaccard Coefficient | - | 1 | - | 0.22 | - | 0.21 | - | 0.17 | - | 0.18 |
| Number of Individuals Evaluated | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Cells that are shaded yellow have improved from 1994 to 2004.

The improvements to Station 4 indicate that the conditions in Big Creek have improved, which is unrelated to the measures that this study is attempting to evaluate. This implies that the improved condition to Station 5 is more than likely attributed to improvements within Big Creek, as the majority of the water originates from the Big Creek watershed.

The summer 1994 study reports 54 of 100 organisms collected at Station 2 were caddisflies. No caddisflies were collected at Station 2 during the winter 1994 study and no caddisflies were collected during the spring or fall 2004 study. It is postulated that sampling bias, seasonal sampling differences, misidentification or habitat degradation is responsible for this tremendously high and unrepeatable value.

The 1994 study reports that 73 of 100 organisms collected at Station 2 during December were stoneflies. It also reports that 57 of 100 organisms collected at Station 3 during the same study were also stoneflies. This genus of stonefly (*Allocapnia* sp.) are winter hatching insects that imerge from a state of diapause (a period of physiologically enforced dormancy) in November. This enable the colonization of intermittent streams, streams with periodically low oxygen and periodically warm temperatures that are not favorable to other types of stoneflies. As the 2004 sampling timeframe did not follow the same seasonal timeframes of the 1994 study, direct comparisons are limited.

The biological condition scoring criteria for each benthic macroinvertebrates parameter assigns numeric values of 6 for nonimpaired, 4 for slightly impaired, 2 for moderately impaired, and 0 for severely impaired. The numeric values for the first eight rows of Tables 4 and 5 are then totaled and normalized so that the reference locations are equal to 100. Station scores are then compared to their reference stations and assigned biological condition categories based on percent comparison to the reference station score. These criteria are >83% for nonimpaired, 51-82% for slightly impaired, 18-50% for moderately impaired, and <17% for severely impaired. Tables 6 and 7 provide the results of these calculations. Exhibits IV (1994) and V (2004) show the spring impairment categories visually by stream reach on a map of the watershed. Similarly, Exhibits VII (1994) and VIII (2004) show the fall impairment categories. It should be noted that the visual depiction of the impairment categories on these exhibits is station based and not truly representative of the entire upstream stream segment as displayed. This is a convenient way of visually representing the data and is not intended to imply the entire upstream reach possesses a uniform macroinvertebrate community.

Exhibits VI and IX demonstrate the locations of the land use best management conservation practices as they are located within the watershed and are denoted by the 2004 biological condition scoring criteria. As mentioned above, the data is station specific and visual presentation is not intended to imply that the entire upstream reaches posses a uniform community.

TABLE 6 – BENTHIC MACROINVERTEBRATE BIOLOGICAL CONDITION SCORING, JULY 1994 AND APRIL 2004

| Parameter | Stati | ion 1 | Stati | ion 2 | Stati | ion 3 | Stati | ion 4 | Stati | ion 5 |
|---------------------------------------|-------|-------|--------|-----------------|--------|----------------|-------|-----------------|-------|---------------------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Total Number of Taxa | 6 | 6 | 6 | 6 | 4 | 4 | 4 | <mark>6</mark> | 4 | 4 |
| Total Number of EPT Taxa | 6 | 6 | 6 | 2 | 4 | 0 | 6 | 2 | 6 | 2 |
| Percent Contribution of Dominant Taxa | 4 | 4 | 0 | 4 | 0 | 2 | 2 | 4 | 0 | 2 |
| Ratio of EPT/Chironomidae | 6 | 6 | 6 | 2 | 6 | 2 | 2 | <mark>6</mark> | 0 | <mark>6</mark> |
| Modified Biotic Index | 6 | 6 | 6 | 6 | 4 | <mark>6</mark> | 6 | 6 | 6 | 6 |
| Ratio of Scraper/Filterer | 6 | 6 | 4 | <mark>6</mark> | 6 | 6 | 0 | <mark>6</mark> | 0 | <mark>6</mark> |
| Ratio of Shredder/Nonshredder | 6 | 6 | 0 | <mark>6</mark> | 0 | 4 | 0 | 0 | 0 | 0 |
| Community Similarity - Community Loss | 6 | 6 | 6 | 6 | 4 | 4 | 4 | <mark>6</mark> | 6 | 6 |
| Total | 46 | 46 | 34 | <mark>38</mark> | 28 | 28 | 24 | <mark>36</mark> | 22 | <mark>32</mark> |
| Percent of Reference | 100 | 100 | 74 | <mark>83</mark> | 61 | 61 | 52 | <mark>78</mark> | 48 | <mark>70</mark> |
| Impairment Category | None | None | Slight | None | Slight | Slight | Mod | Slight | Mod | <mark>Slight</mark> |

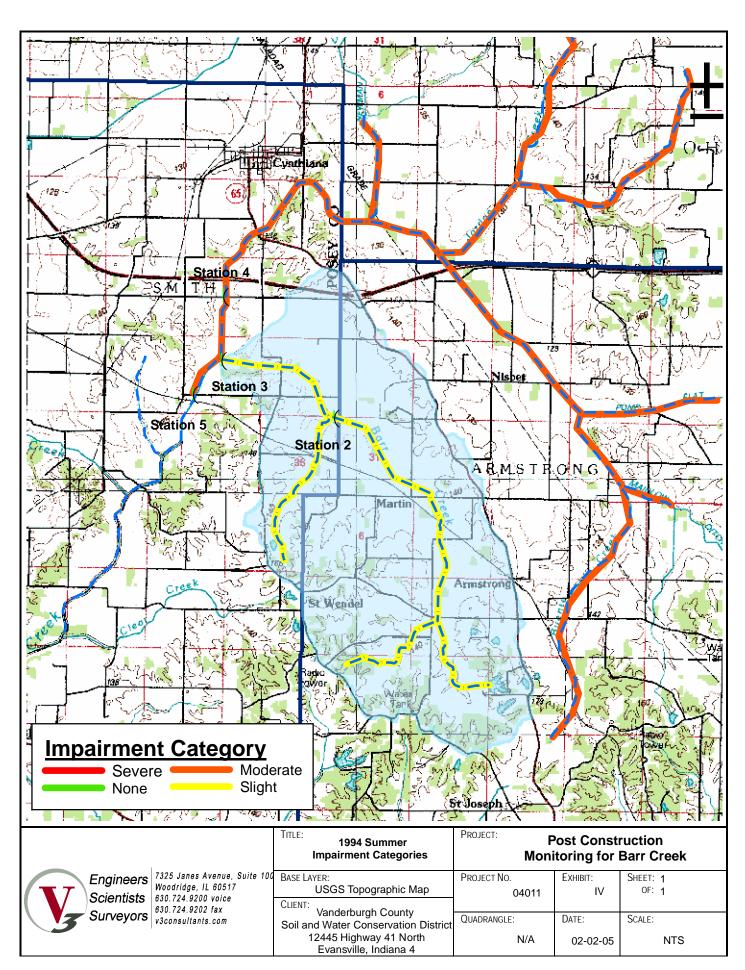
Cells that are shaded yellow have improved from 1994 to 2004.

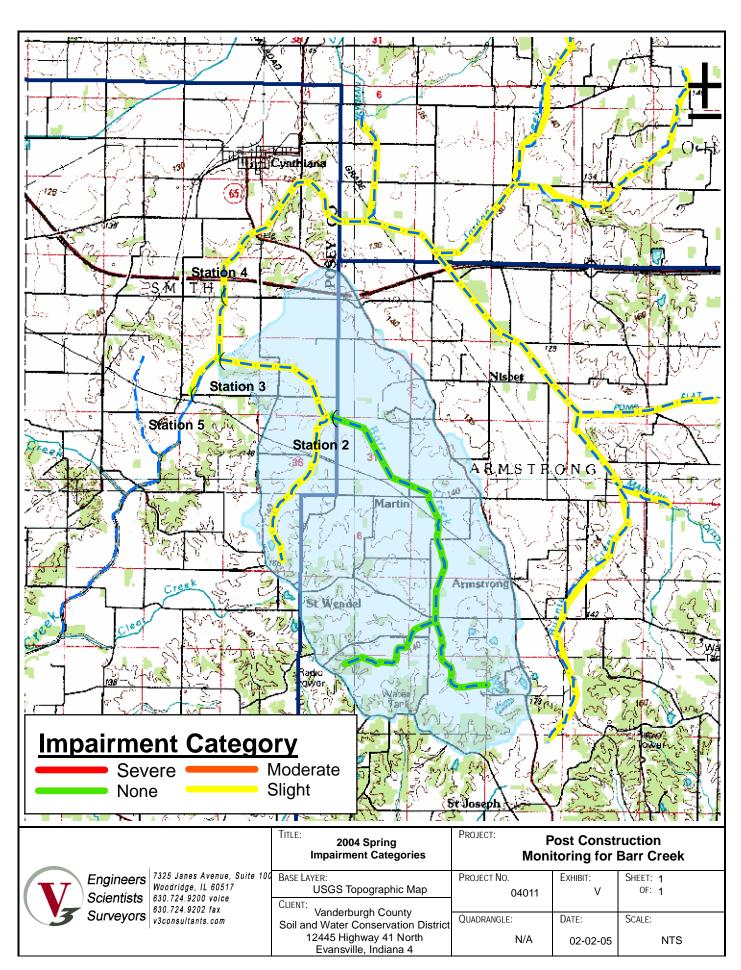
Impairment Categories are defined as: greater than 83% of reference site = Nonimpaired

51% to 82% of reference site = Slightly Impaired

18% to 50% of reference site = Moderately Impaired

less than 17% of reference site = Severely Impaired





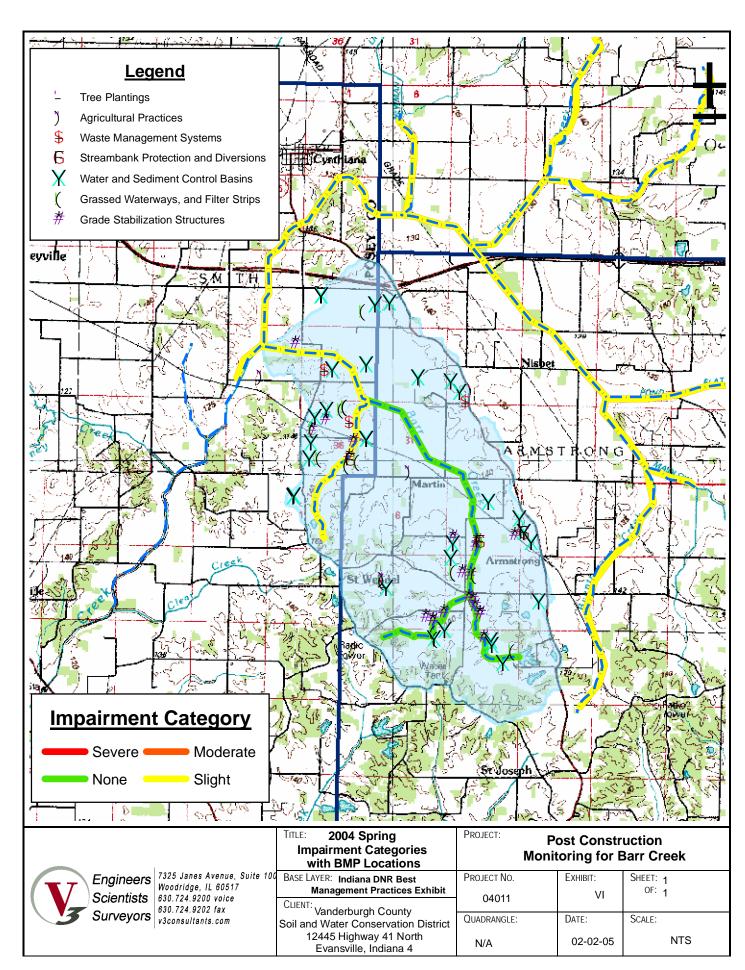


TABLE 7 – BENTHIC MACROINVERTEBRATE BIOLOGICAL CONDITION SCORING, DECEMBER 1994 AND OCTOBER 2004

| Parameter | Stati | on 1 | Stati | ion 2 | Stati | ion 3 | Stati | ion 4 | Stati | ion 5 |
|---------------------------------------|-------|------|--------|-----------------|--------|--------|--------|----------------|--------|----------------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Total Number of Taxa | 6 | 6 | 4 | <mark>6</mark> | 6 | 6 | 6 | 6 | 6 | 6 |
| Total Number of EPT Taxa | 6 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Percent Contribution of Dominant Taxa | 0 | 2 | 0 | 4 | 0 | 2 | 4 | 4 | 6 | 6 |
| Ratio of EPT/Chironomidae | 6 | 6 | 6 | 4 | 6 | 2 | 6 | 0 | 2 | 0 |
| Modified Biotic Index | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 4 | 6 | 4 |
| Ratio of Scraper/Filterer | 6 | 6 | 6 | 6 | 6 | 6 | 4 | <mark>6</mark> | 6 | 6 |
| Ratio of Shredder/Nonshredder | 6 | 6 | 6 | 6 | 6 | 6 | 0 | <mark>6</mark> | 0 | 0 |
| Community Similarity - Community Loss | 6 | 6 | 4 | 4 | 4 | 4 | 6 | 4 | 4 | <mark>6</mark> |
| Total | 42 | 44 | 32 | <mark>36</mark> | 34 | 32 | 32 | 30 | 30 | 28 |
| Percent of Reference | 100 | 100 | 76 | <mark>86</mark> | 81 | 73 | 76 | 68 | 71 | 64 |
| Impairment Category | None | None | Slight | None None | Slight | Slight | Slight | Slight | Slight | Slight |

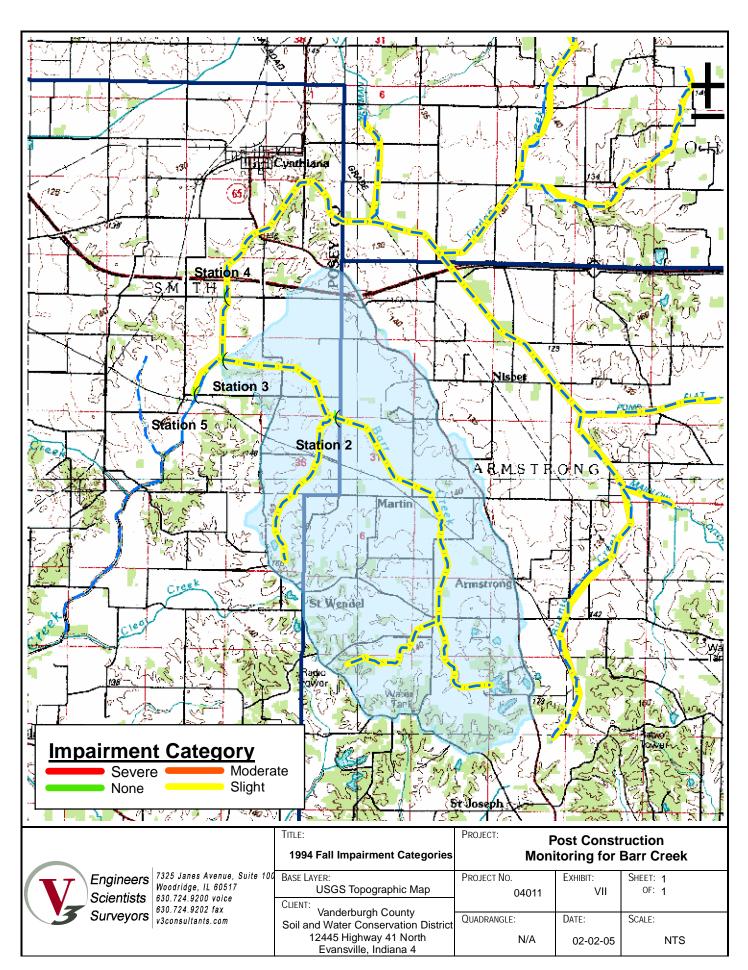
Cells that are shaded yellow have improved from 1999 to 2004.

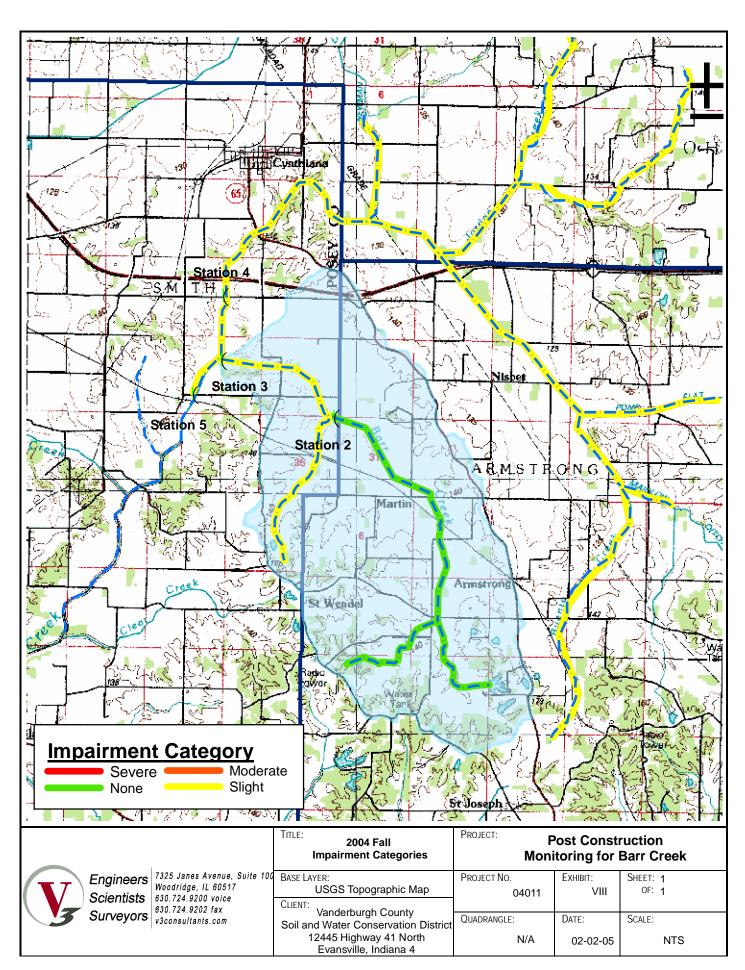
Impairment Categories are defined as: greater than 83% of reference site = Nonimpaired

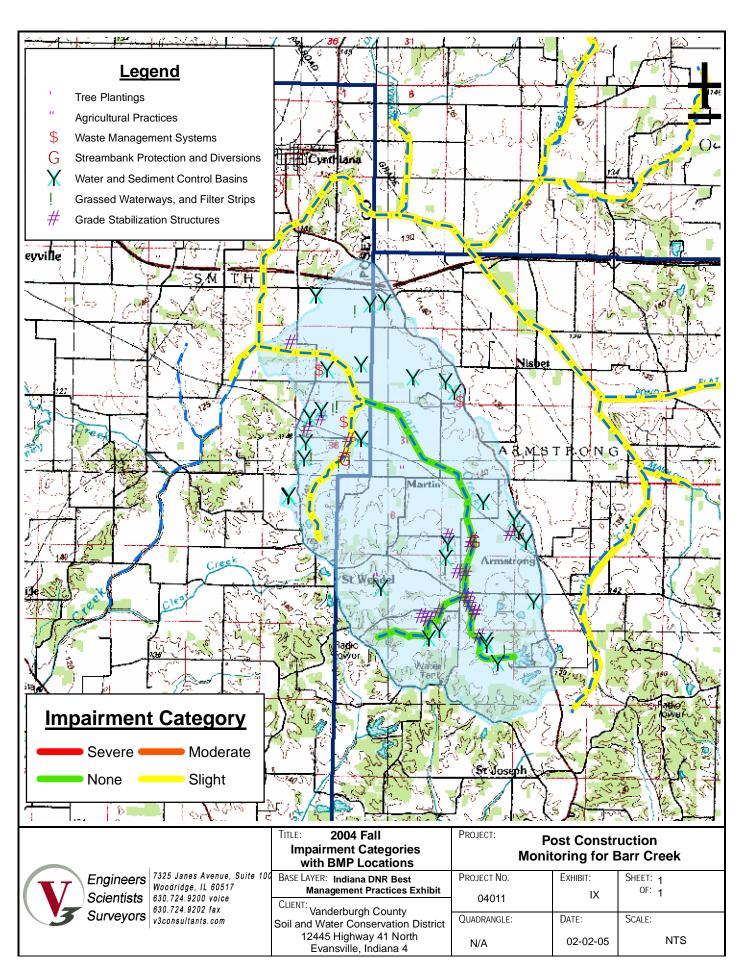
51% to 82% of reference site = Slightly Impaired

18% to 50% of reference site = Moderately Impaired

less than 17% of reference site = Severely Impaired







5.2 Physical Evaluation Results

The purpose for evaluating the physical habitat features of the selected locations within the Barr Creek watershed is to quantify the condition and quality of the instream and riparian habitat. The use of the U.S. Environmental Protection Agency (USEPA) habitat scoring technique used by the 1994 study was repeated by this study for comparative purposes. This was applied to all five Barr Creek sampling stations. Field datasheets from both spring and fall assessments are provided in Appendix I and station photographs from both spring and fall assessments are provided in Appendix III.

The summary of the USEPA habitat scoring technique from the 1994 and 2004 surveys are provided in Table 8. Addition habitat assessments performed during the 2004 study, including the Ohio EPA Qualitative Habitat Evaluation Index (QHEI) and the USEPA rapid and qualitative habitat assessment, are also included in Appendix I.

TABLE 8 – USEPA HABITAT SCORING TECHNIQUE RESULTS FOR BARR CREEK, 1994 AND 2004

| | Stati | ion 1 | Stati | on 2 | Stat | ion 3 | Stati | on 4 | Stati | ion 5 |
|----------------------------------|-------|-----------------|-------|-----------------|------|-----------------|-------|-----------------|-------|-----------------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Habitat Parameters | | | | | | | | | | |
| Bottom Substrate/Available Cover | 16 | <mark>17</mark> | 5 | <mark>10</mark> | 5 | 2 | 6 | 2 | 6 | 1 |
| Embeddedness | 15 | 13 | 10 | 13 | 10 | 8 | 10 | 6 | 10 | 6 |
| Velocity and Depth | 16 | 13 | 6 | <mark>13</mark> | 6 | <mark>13</mark> | 6 | <mark>16</mark> | 6 | <mark>16</mark> |
| Channel Alteration | 11 | <mark>15</mark> | 7 | 6 | 7 | 5 | 7 | 6 | 7 | 4 |
| Bottom Scouring and Deposition | 15 | 6 | 7 | 3 | 7 | 2 | 8 | 1 | 8 | 2 |
| Pool/Riffle, Run/Bend Ratio | 11 | <mark>15</mark> | 7 | 3 | 7 | 2 | 7 | 2 | 7 | 2 |
| Bank Stability | 8 | 5 | 5 | 1 | 5 | 1 | 3 | 1 | 3 | 1 |
| Bank Vegetative Stability | 10 | 3 | 9 | 7 | 9 | 2 | 9 | 2 | 9 | 4 |
| Streamside Cover | 9 | 7 | 5 | 4 | 5 | 2 | 3 | 2 | 3 | 1 |
| Total Score | 107 | 94 | 61 | 60 | 61 | 37 | 59 | 38 | 59 | 37 |
| Percent of Reference | 100 | 100 | 57 | <mark>64</mark> | 57 | 39 | 55 | 40 | 55 | 39 |

Cells that are shaded yellow have improved from 1994 to 2004.

5.3 Chemical Evaluation Results

V3 performed the sampling events on April 27, 28, and 29, and October 12 and 13, 2004. The parameters included oxidation-reduction potential, temperature, conductivity, pH, dissolved oxygen, flow, and turbidity. Water quality data sheets are included in Appendix I. Table 9 summarizes the results from the spring water quality data collected during both the 1994 study and the current 2004 sampling effort. Table 10 summarizes the results from the fall water quality data in the same fashion.

TABLE 9 – SUMMARY OF SPRING SAMPLING WATER QUALITY DATA FOR BARR CREEK, JULY 1994 AND APRIL 2004

| | Stati | on 1 | Stati | ion 2 | Stat | tion 3 | Stati | ion 4 | Station 5 | |
|-------------------------|-------|-------|-------|-------|------|--------|-------|--------|-----------|--------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Parameters | | | | | | | | | | |
| ORP (mV) | - | 106 | - | 33 | - | 107 | - | 81 | - | 81 |
| Temperature (°C) | 25.6 | 12.2 | 31.1 | 12.3 | 36.1 | 14.6 | 32.8 | 21.3 | 35.0 | 16.4 |
| Conductivity (mµohms) | 530 | 603 | 390 | 460.5 | 350 | 518 | 360 | 580.7 | 310 | 534.4 |
| pH (SU) | 8.2 | 8.21 | 8.9 | 8.43 | 9.3 | 8.09 | 8.4 | 8.03 | 9.2 | 8.13 |
| Dissolved Oxygen (mg/L) | 7.3 | 5.74 | 15.6 | 6.32 | 12.2 | 10.18 | 10.2 | 7.49 | 18.2 | 9.32 |
| Flow (ft3/sec) | 1 | 2.853 | - | 2.559 | - | 3.416 | 1 | 10.646 | - | 17.821 |
| Turbidity (NTU) | - | 8.17 | - | 6.65 | - | 5.27 | - | 18.2 | - | 21.1 |

TABLE 10 – SUMMARY OF FALL SAMPLING WATER QUALITY DATA FOR BARR CREEK, DECEMBER 1994 AND OCTOBER 2004

| | Stati | ion 1 | Stat | ion 2 | Sta | tion 3 | Stati | ion 4 | Station 5 | |
|-------------------------|-------|-------|------|--------|------|--------|-------|-------|-----------|-------|
| | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 | 1994 | 2004 |
| Parameters | | | | | | | | | | |
| ORP (mV) | - | 290 | - | 246 | 1 | 299 | 1 | 306 | ı | 281 |
| Temperature (°C) | 3.3 | 14.6 | 4.4 | 15.4 | 3.3 | 15.4 | 5.0 | 16.1 | 5.6 | 16.0 |
| Conductivity (mµohms) | 640 | 534.3 | 500 | 815.6 | 510 | 436.2 | 440 | 409 | 460 | 404.1 |
| pH (SU) | 8.0 | 7.61 | 7.8 | 7.54 | 7.9 | 7.58 | 8.0 | 7.43 | 8.0 | 7.5 |
| Dissolved Oxygen (mg/L) | 12.0 | 7.85 | 12.0 | 8.65 | 13.0 | 13.8 | 13.4 | 8.78 | 13.4 | 11.7 |
| Flow (ft3/sec) | - | 1.037 | - | 0.6405 | - | 0.2422 | - | 1.465 | - | 3.622 |
| Turbidity (NTU) | - | 5.8 | - | 14 | - | 5.7 | - | 20 | - | 30 |

5.4 Field Review

V3 provided Vanderburgh County SWCD, LARE staff, as well as the representatives of interested volunteer water quality monitoring groups with advanced notification of the sampling dates. Representatives of these organizations were able to attend the sampling events and observe and learn the field data collection techniques. The sampling efforts were performed with Amy Steeples, Ronnie Boehm, and Gary Seibert (all three are with the IDNR) in attendance during all of the spring sampling efforts, and Amy Steeples of the IDNR in attendance during all of the fall sampling.

6.0 DISCUSSION

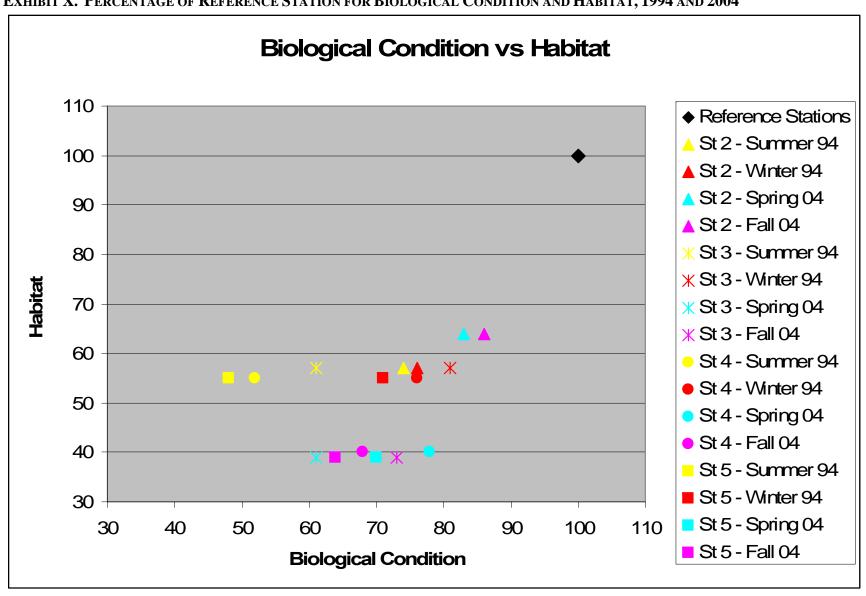
Exhibit X graphically displays comparisons of each station from all of the survey events to their respective reference stations. The reference stations are normalized at 100% of the habitat scoring and 100% of the biological condition. This represents the achievable potential of each sampling station. All four of the sampling events are represented by one graphic point in the upper right corner of the graph, as they all overlap with each other at 100 by 100. Each station is depicted by differing shapes (i.e. triangles represent Station 2, squares represent Station 5). Each sampling event is depicted by differing colors (i.e. yellow represents summer 1994, blue represents spring 2004). The biological data source for this graph can be found on Tables 6 and 7, the habitat source can be found on Table 8.

As the reference stream (Station 1) represents regional expectations, the quality of the stream at Station 2 changed for the better with respect to both the physical and biological condition. Through the interpretation of this graph, Station 2, the upstream most sampling location on Barr Creek, is the only station that demonstrated this trend as both of the 2004 sampling events are closer to the reference station condition than either of the 1994 sampling events. This graph also demonstrates that the habitat condition at Stations 3, 4 and 5 have degraded. Station 3 is the furthest downstream station on Barr Creek, just upstream of the confluence of Barr and Big Creeks. Stations 4 and 5 are both along Big Creek.

The water quality values from the 2004 study represent normal stream conditions and do not represent any regionally atypical situations. However, the habitat quality results do indicate a concern for aquatic life at both Big Creek stations and the most downstream location on Barr Creek. None of the stations are within the habitat classifications of Comparable or Supporting. Only Station 2 is within the habitat classification of Supporting. Stations 3, 4 and 5 are all within the habitat classification of Nonsupporting. The relationship between habitat quality and biological condition demonstrates that good quality habitat will support high quality biological communities, and responses to minor alterations in habitat will be subtle and of little consequence. Discernible biological impairment results as habitat quality continues to decline (USEPA 1989).

In areas of severe habitat degradation, predicting the degree of biological impairment becomes more difficult. Community structure is less dependent on habitat diversity, which is effectively simplified by degradation, and more dependent on the opportunistic colonization strategies of a relatively few tolerant species. These opportunists are adapted to unfavorable environmental conditions and thrive in these marginal conditions. Therefore biological measures are relatively insensitive to habitat variations in this range, and a nonsupporting habitat characterization may correspond to either a moderately or severely impaired biological condition (USEPA 1989).

EXHIBIT X. PERCENTAGE OF REFERENCE STATION FOR BIOLOGICAL CONDITION AND HABITAT, 1994 AND 2004



Habitat at Stations 3, 4 and 5 were all 39 or 40% of the regional expectation represented by the reference station. The qualitative assessment which most significantly contributed the quantitative value representing degradation within the Habitat evaluation parameters is: Bottom Substrate/Available Cover; Pool/Riffle, Run/Bend Ratio; and Channel Alteration. These three parameters provided a comparative shortfall to the reference station of 38 for Station 3, 37 for Station 4, and 40 for Station 5. All three of these stations have unstable silt bottoms, very poor representation of riffles, and are significantly channelized. Unstable substrates eliminate populations of macroinvertebrates that require stable locations to live, such as the net-spinning or the retreat-making caddisflies or the scraping mayfilies. The lack of riffles restrict macroinvertebrate population of filter feeders which need flowing water to provide accessibility to their food source.

The macroinvertebrate community analysis compared to the reference site's macroinvertebrate community demonstrated no impairment of the community at Station 2, and slight impairment at Stations 3, 4 and 5. The macroinvertebrate community and habitat scores for Stations 3, 4 and 5 are representative of a situation indicative of nutrient enrichment, which will artificially sustain a more diverse fauna than dictated by the habitat quality. As the habitat degradation proceeds, nutrient enrichment will no longer support a diverse community and a drastic decrease in biological condition will result (USEPA 1989).

V3 performed the 2004 study abiding by the suggested spring and fall sampling seasons as a result of discussions with the IDNR and the Vanderburgh County SWCD. It was concluded that attempting to duplicate the 1994 sampling seasons was not in the best interest of meaningful water quality results. Water temperature readings from summer 1994 were as high as 97°F in Barr Creek and 95°F in Big Creek. The USEPA STORET database from station #03378550, near Wadesville on Big Creek, approximately five miles downstream of Station 5, lists mean water temperature at 50°F and the upper 85th percentile as 72°F. If field measurements of water temperature from 1994 were accurate, it is representative of an extreme condition and should have been cause enough for re-scheduling the sampling effort.

Biological samplings in December 1994 were dominated by a genus of stonefly (*Allocapnia* sp.). The 1994 study reports that 73 of 100 organisms collected at Station 2 and 57 of 100 organisms collected at Station 3 during December were *Allocapnia* sp. stoneflies. V3 performed the 2004 study abiding by the suggested spring and fall sampling seasons as a result of discussions with the IDNR and the Vanderburgh County SWCD. It is not likely that sampling outside of the winter months would allow for the collection of *Allocapnia* sp. (DeWalt, 2005; Essig, 2005; Provonsha, 2005). Almost all of the species of *Allocapnia* are associated with the temperate deciduous forests (Ross and Ricker, 1971), of which Barr and Big Creeks are predominately draining agricultural areas.

The *Allocapnia* sp. stonefly emerges from its eggs in April and crawls deep into the sediment during the first instar stage. These larvae spend the months in diapause, which enable the colonization of intermittent streams (Mackie, 2001). In November the larvae migrate through the sediment back to the stream bottom where it eats the fall's leafpack. These stoneflies provide limited pollution tolerance insight as their life cycle allows them to avoid harsh conditions while they are dormant (DeWalt 2005). The high water quality requirements typical of stoneflies

usually exclude their populations from streams with low oxygen levels, high temperatures and nutrient enrichment. However, the *Allocapnia* are able to avoid the detrimental timeframes and survive in streams such as Big and Barr Creeks which posses periods of high temperatures, low oxygen and nutrient enrichment.

Sediment load is an essential component to a healthy stream (Dunne and Leopold, 1978) and a representation of increased sediment intolerant species may denote an undesired geomorphic stream condition. To set sediment intolerant species as a desired community could be achieved with detrimental bedload affects to scouring and erosion. No further discussion of sediment intolerant species will be included in this report.

Differences in land use practices within the watershed from Posey County and Vanderburgh County may explain some of the macroinvertebrate and habitat results from this study. Regionally, Posey County possesses a greater depth of loss or the accumulation of wind blow silts. It is healthier for the aquatic streams, from both a biological and physical perspective, to implement progressive agricultural conservation practices.

The objectives of this study, and future studies, may have benefited from habitat variables that were not presented within this report but were measured during the field assessments of 2004. The Ohio EPA Qualitative Habitat Evaluation Index (QHEI) Field Sheets and the USEPA Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers, Periphyton, Benthic Macroinvertebrates and Fish Habitat Assessment Field Data Sheets have been included within Appendix I. As habitat degradation has been identified at Stations 3, 4 and 5, this data may assist interpretations of future investigations.

7.0 SUMMARY AND RECOMMENDATIONS

Land use best management conservation practices were implemented by both the Vanderburgh and Posey County SWCD's to improve the Barr Creek watershed from 1993 through 1998. The land use best management conservation practices included: no-till conservation tillage, stormwater runoff diversions, cool season grass filter strips, pipe structure grade stabilization structures, a poured concrete toewall grade stabilization structure, rock rip-rap grade stabilization structures, newly created grass waterways, repaired grassed waterways, integrated crop management, pasture and hayland plantings, rock rip-rap streambank protection, tree plantings, waste management containment systems, and water and sediment control basins.

Comparative interpretations were also limited between the 1994 and 2004 studies as different sampling seasons were utilized, the 1994 summer study is comparative to the 2004 spring study and the 1994 winter study is comparative to the 2004 fall study. This discrepancy in seasonality negatively affected the validity of the water quality and benthic macroinvertebrate community comparisons. Additionally, different protocols for the evaluations of benthic macroinvertebrate surveys negatively affected the validity of the comparative results. No data was available from IDEM to assist in this evaluation.

Taking into consideration the limitations of valid comparisons, the 1994 study and the 2004 study are only able to be compared to their regionally achievable potentials, as represented by the reference stations. Rating of the sampling stations in comparison to the reference stations, the conditions of the macroinvertebrate communities either remains constant or it improves from 1994 to 2004. The comparison between the study results from the summer shortly after to the spring more than ten years after the land use best management conservation practices were implemented shows an improved biological condition at Station 2 on Barr Creek (Slight to None) and at Stations 4 and 5 on Big Creek (Moderate to Slight). Comparison between the winter shortly after to the fall more than ten years after show an improved biological condition at Station 2, where the rating improved from Slight Impairment to No Impairment. All other impairment category rankings remained unchanged.

The habitat evaluation used the same methods from the 1994 study to the 2004 study. Habitat showed overall degradation at Stations 3, 4 and 5. Improvements to the watershed specifically related to the stream's substrate condition, lack of available cover, ratio of riffles and runs to pools, and the ditching and channelization.

The best management land use conservation practices implemented by the Vanderburgh and Posey County Soil and Water Conservation Districts to improve the Barr Creek watershed were all located with rural agricultural areas. All of the benthic macroinvertebrate impairment categories by sampling stations through a comparison of 1994 to the 1994 reference station and 2004 sampling stations to the corresponding 2004 reference station either remained the same or showed improvements. Three of the four sampling stations from 1994 to 2004 demonstrated a degraded habitat condition. This report concludes that the measures taken to install no-till conservation tillage, stormwater runoff diversions, cool season grass filter strips, pipe structure grade stabilization structures, a poured concrete toewall grade stabilization structure, rock rip-rap

grade stabilization structures, newly created grass waterways, repaired grassed waterways, integrated crop management, pasture and hayland plantings, rock rip-rap streambank protection, tree plantings, waste management containment systems, and water and sediment control basins may have been effective in improving the quality of some attributes within the Barr Creek watershed. The habitats of Barr and Big Creeks require additional attention.

The 1994 study recommended implementing programs that protect or restore natural streamside vegetation, as well as identifying all areas with severely slumping banks and implementing stabilization projects. These recommendations remain relevant, since ten years later habitat evaluations indicate a lower quality, and implementation measures should be pursued where funding and willing land owner participation exists.

Land use best management conservation practices have been implemented within the 10,000 acres of Barr Creek's watershed. We recommend the continued implementation of habitat focused watershed improvement measures within Barr Creek's watershed, especially within the portions of Posey County. We recommend that similar measures in the upstream rural and agricultural areas of the 40,000 acres of Big Creek's watershed be implemented. Complications may arise as Big Creek's watershed spans Posey, Gibson and Vanderburgh counties, however, the improvements in Barr Creek demonstrate the validity of implementing best management land use conservation practices.

8.0 REFERENCES

American Public Health Association, American Water Works Association and Water Environment Federation. 1995. Standard Methods for the Examination of Water and Wastewater. Nineteenth Edition.

Bednarik, A.F. and W.P. McCafferty. 1979. Biosystematic Revision of the Genus Stenonema (Ephemeroptera: Heptageniidae). Canadian Bulletin of Fisheries and Aquatic Sciences. Bulletin 201.

Bergman E.A. and W.L. Hilsenhoff. 1978. Baetis (Ephemeroptera: Baetidae) of Wisconsin. The Great Lakes Entomologist. Volume 11.

DeWalt, R.E., PhD. 2005. Illinois Department of Natural Resources. Aquatic Entomologist, Illinois Natural History Survey, Center for Biodiversity. Telephone conversation regarding *Allocapnia* sp. with Ed Belmonte of V3. November 3, 2005.

Dunne, T. and L.B. Leopold. 1978. Water in Environmental Planning. W.H. Freeman and Company. pp. 818.

Essig, H. 2005. Illinois Department of Natural Resources. Telephone conversation regarding *Allocapnia* sp. with Ed Belmonte of V3. November 2, 2005.

Hilsenhoff, W.L. 1982. Using a Biotic Index to Evaluate Water Quality in Streams. Wisconsin Department of Natural Resources. Technical Bulletin No. 132.

Hilsenhoff, W.L. 1995. Aquatic Insects of Wisconsin. Keys to Wisconsin Genera and Notes on Biology, Habitat, Distribution and Species. Publication Number 3 of the Natural History Museums Council, University of Wisconsin-Madison.

Indiana Department of Environmental Management. 2005a. Correspondence from Chuck Bell of IDEM regarding surface water chemistry data to Ed Belmonte of V3. May 2, 2005.

Indiana Department of Environmental Management. 2005b. Correspondence from Jim Stahl of IDEM regarding fish tissue and/or sediment contaminants data to Ed Belmonte of V3. May 2, 2005.

Indiana Department of Environmental Management. 2005c. Correspondence from Todd Davis of IDEM regarding macroinvertebrate community data to Ed Belmonte of V3. May 2, 2005.

Indiana Department of Environmental Management. 2005d. Correspondence from Stacey Sobat of IDEM regarding fish community data to Ed Belmonte of V3. May 17, 2005.

Indiana Department of Natural Resources. 2005. Correspondence from Cecil Rich, LARE Program Biologist, to Ed Belmonte of V3. October 24, 2005.

Mackie, G.L. 2001. Applied Aquatic Ecosystem Concepts. Kendall/Hunt Publishing Company. ISBN 0-7872-7490-9.

McCafferty, W.P. and A.V. Provonsha. 1998. Aquatic Entomology. The Fishermen's and Ecologists' Illustrated Guide to Insects and Their Relatives. Jones and Bartlett Publishers.

McCafferty, W.P. and R.D. Waltz. 1990. Revisionary Synopsis of the Baetidae (Ephemeroptera) of North and Middle America. Department of Entomology, Purdue University. Transactions of the American Entomological Society 116(4): 769-799.

Merritt, R.W. and K.W. Cummins. 1996. An Introduction to the Aquatic Insects of North America. Third Edition. Kendall/Hunt Publishing Company.

Ohio Environmental Protection Agency. 1987. Biological Criteria for the Protection of Aquatic Life: Volume I: The Role of Biological Data in Water Quality Assessment. Ecological Assessment Section, Division of Water Quality Planning & Assessment. July 24, 1987, revised February 15, 1988.

Ohio Environmental Protection Agency. 1987. Biological Criteria for the Protection of Aquatic Life: Volume II: Users Manual for Biological Field Assessment of Ohio Surface Waters. Ecological Assessment Section, Division of Water Quality Planning & Assessment. October 30, 1987, revised January 1, 1988; September 30, 1989; August 30, 1996; March 2001.

Ohio Environmental Protection Agency. 1989. Biological Criteria for the Protection of Aquatic Life: Volume III: Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities. Ecological Assessment Section, Division of Water Quality Planning & Assessment. September 30, 1989, revised March 2001, June 2005.

Ohio Environmental Protection Agency. 1989. The Qualitative Habitat Evaluation Index [QHEI]: Rationale, Methods, and Application. Ecological Assessment Section, Division of Water Quality Planning & Assessment. November 6, 1989, revised June 24, 2001.

Provonsha, A., PhD. 2005. Purdue Unvirersity. Department of Entomology. Telephone conversation regarding *Allocapnia* sp. with Ed Belmonte of V3. November 3, 2005.

Purdue University, Department of Entomology. 2005. Correspondence from Arwin Provonsha, Curator of Collections, of Purdue University to Walter Levernier of V3. March 8, 2005.

Ross, H.H. and W.E. Ricker. 1971. The classification, evolution, and dispersal of the witner stonefly genus *Allocapnia*, Ill. Biol. Monogr. 45.

Schuster, G.A. and D.A. Etnier. 1978. A Manual for the Identification of the Larvae of the Caddisfly Genera Hydropsyche Pictet and Symphitopsyche Ulmer in Eastern and Central North America (Trichoptera: Hydropsychidae). Environmental Monitoring and Support Laboratory. Office of Research and Development. U.S. Environmental Protection Agency. October 1978.

- U.S. Environmental Protection Agency. 1974. Taxonomy and Ecology of Stenonema Mayflies (Heptageniidae: Ephemeroptera). National Environmental Research Center, Office of Research and Development. December 1974.
- U.S. Environmental Protection Agency. 1989. Rapid Bioassessment Protocols for Use in Streams and Rivers. Benthic Macroinvertebrates and Fish. EPA/440/4-89/001. May 1989.
- U.S. Environmental Protection Agency. 1999. Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers. Periphyton, Benthic Macroinvertebrates and Fish. Second Edition. EPA 841-B-99-002. July 1999.
- U.S. Environmental Protection Agency. 2005. USEPA STORET database. Big Creek monitoring station near Wadesville, Station ID #03378550.
- U.S. Geological Survey. 2005. Northern Prairie Wildlife Research Center. Stoneflies of the United States. Stoneflies of Indiana. November 1, 2005.

Wetzel, R.G. 1975. Limnology.

Wetzel, R.G. and G.E. Likens. 1979. Limnological Analysis.

APPENDIX I:

V3 COMPANIES FIELD DATA SHEETS

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

| | | page of |
|-----------------|---------------------|------------------------------------|
| STREAM NAME Luc | h Creek | LOCATION Harmonie State Park |
| STATION # | RIVERMILE | STREAM CLASS |
| LAT | LONG | RIVER BASIN |
| STORET# | · | AGENCY |
| COLLECTED BY ES | 3, WGL DATE 4/27/04 | LOT# |
| TAXONOMIST ESE | 3, WGL DATE | SUBSAMPLE TARGET 100 200 300 Other |

| 0 | rganisms | No. | LS | TI | TCR | o | rganisms | No. | LS | TI | TCF |
|--------------------|---------------------------|----------|----------|-----|-----|----------------------------|-------------------------|----------|----------|---------------|----------|
| Oligochaeta | MIN (9) | R | A | wer | 1 | Megaloptera | | | | | |
| Hirudinea | MIN B | V | A | 664 | , | Coleoptera larva, | 1 > Outiscidue | / | I | (v)()L | <u> </u> |
| | 9 | | | | | adul+ | 1 / 3 | / | Α | wu | |
| Isopoda | | | | | | unknown | 11 - Horophilidae | 4 | A | wel | <u> </u> |
| Amphipoda | | | | | | Simulidue Diptera Brown | HAT IV | <u>ا</u> | エ | WLL | <u> </u> |
| · impinipoda | MI IN ME ME ME INC 144 | 36 | A | her | ' | Blood red | Uning the test that the | TR. | ケー | 1265 | - |
| Decapoda | HAN HAV HALL HALL MAN THE | | | | | Crane+14 | HTJ 11 | 13 | 5= | ري او د | - |
| | | | | | | , | | | | | |
| Ephemeroptera | 1160. S | 8 | I | 666 | 17 | 1, 1 | | | | | |
| • | Biti - 11 (1) | 7 | <u>I</u> | ۵6۱ | 4 | Gastropoda Left | 100 | 70 0 | A | mp, | |
| • | Carrid-11 U | 8 | | WGL | | | 1 - lymnidae | 4 | A | 46 | |
| | | | | | | Pelecypoda\ | אין אין אין אין אין | 44 | Α. | 6 66 | - |
| Plecoptera | | | | | | Pelecypoda | ווו ואו אח | 0 | | | |
| : | | | | | | Other Planaria | | | | | |
| | | | | | | , | | 7 | <u> </u> | 1061 11061 | |
| | | | | | | Calpt consequence | | 4 | + | 46L | <u> </u> |
| Frichoptera | Hydro - munu 11 | × | エ | WOL | 1 | Groud pe dule | HH (2) | 1 | I | سالا | |
| | | Œ | | | | | | | | | |
| | | | | | | e i | | | | | |
| | | | | | | | | | | | |
| | | | , | | | | | | | | |
| -lemiptera | Hro striber -1 | <u>\</u> | A | UGL | 4 | | | | \Box | | |
| | Gerri Dec 7 | 0 | | | | | | | | | • |

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition - Form 3

Total No. Organisms

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME R | ish Creek | | LOCATIO | 1 Harme | onie | State Park | | , | _ |
|--|---------------------------------------|---|-------------|---------------------------------------|---------------------------------------|--|--------------|-------------------------|---|
| STATION# 1 | | | STREAM (| | · · · · · · · · · · · · · · · · · · · | | | | |
| LAT | | | RIVER BA | | · · · · · · · · · · · · · · · · · · · | | · · · · · | | _ |
| STORET # | _ 10110 | | | אווע | | | | | _ |
| | 11.61 | EID | AGENCY | · · · · · · · · · · · · · · · · · · · | 77 | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | · | | _ |
| INVESTIGATORS | · · · · · · · · · · · · · · · · · · · | E 2 R | | la 1. · | | NUMBER | | | _ |
| FORM COMPLETED | L, E)B | | DATE 4/ | 27/64 AM | | SON FOR SURVEY | | | |
| HABITAT TYPES | Indicate the Cobble 2 | percentage of Sn d Macrophytes | each habita | t type present | t ted Banks≤ ☐ Other (| Ø □ Sand_8 | <u>~</u> % | | _ |
| SAMPLE | | | | | | | | | _ |
| COLLECTION | How were t | he samples col | lected? | ☐ wading | ☐ from bar | nk 🛭 from bo | at | • | |
| | ☑ Cobble / | number of ja o 2 Sn d Macrophytes | ags 10 | ☑ Vegetat | ed Banks / | <u>∪</u> Ø Sand ∪) | | | |
| GENERAL COMMENTS | | | | | | | | | |
| | | | | | | | | | |
| Macrophytes FIELD OBSERVA Indicate estimated | TIONS OF I | MACROBEN 0 = Absen | t/Not Obsei | ved, 1 = Ra | are (1-3 or | ganisms), 2 = Coi | 0 1 nmon (3- | 2 ③ 2 ③ 9 | |
| | | | | ` | | | | usms) | |
| Porifera | | 3 4 Aniso | - | | | Chironomidae | 0 1 | 2 3 | |
| Hydrozoa | | 3 4 Zygo | | | 2 3 4 | Ephemeroptera | 0 1 | 2 3 | |
| Platyhelminthes | | | ptera | | 2 3 4 | Trichoptera | 0 1 | 2 3 | |
| Turbellaria | | 1 | optera | | 2 3 4 | Other | 0 1 | 2 3 | |
| Hirudinea | | - I | loptera | | 2 3 4 | , | | | |
| Oligochaeta | | 3 4 Sialio | | | 2 3 4 | · | | | |
| Isopoda | | | dalidae | | 2 3 4 | | | | |
| Amphipoda | | 3 4 Tipul | | | 2 3 4 | | | | |
| Decapoda | | | didae | | 2 3 4 | | | | |
| Gastropoda Bivolvia | | | liidae | | 2 3 4 | | | | |
| Bivalvia | 0 1 2 | 3 4 Tabir | | | 2 3 4 2 3 4 | | | | |
| 28. 38. E. C. C. | 1 | Culci | dae 80. 2. | 300.30 | <u> </u> | | | | - |
| י אי שי ק מי מי מי | - 5C | با ما اور ا | 1.5 | 7 0 60 | » به به | & Q | | | |
| apid Bioassessmei Iacroinvertebrates | | Second Edit | | | le Rivers: | Periphyton, Bent | hic | | A |
|]. | | DE | , // | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | v v | <u>v</u> | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | sh Creek | LOCATION | | | |
|----------------------------|--|--|--------------------|---|-----------------------------|
| | IVERMILE | STREAM CLA | SS | | |
| LAT 38 4:5 18N LO | | | [| | |
| STORET # 38°4.43 | AN 87°56.497W | AGENCY | | | |
| INVESTIGATORS E | 3, WGL, Gary | , Romie, L | 4my | | |
| FORM COMPLETED BY | | DATE 4/37 TIME 10:30 | 2/0ml 2 (ADP PM | REASON FOR SURVEY | |
| WEATHER CONDITIONS | ☐ rain (: ☐ showers ——%☐ %cl | (heavy rain) steady rain) s (intermittent) oud cover ear/sunny | hours / | Has there been a heavy rain in to Yes No Safuro Air Temperature 9°C Other | the last 7 days? day Nigh + |
| SITE LOCATION/MAP | Draw a map of the sit | e and indicate th | he areas sam | pled (or attach a photograph) | |
| | | | | | |
| | | | ž | · | |
| | | | | | |
| | | | | | • |
| • | | | | | |
| | ! | | | | |
| STREAM CHARACTERIZATION | Stream Subsystem Perennial Inter | rmittent 🗅 Tida | .1 [| Stream Type Coldwater Warmwater | |
| | Stream Origin Glacial Non-glacial montane Swamp and bog | ☐ Spring-fed | | Catchment Areakm ² | |

4/27/04 Rush crock Site #1

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSHED FEATURES | Predominant Surrounding Landuse Forest | Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy |
|---|--|---|
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and record the domin ATrees OShrubs O dominant species present Silver Maple | |
| INSTREAM FEATURES | Estimated Reach Length 100 m Estimated Stream Width 100 m Sampling Reach Area m² Area in km² (m²x1000) km² Estimated Stream Depth m Surface Velocity m/sec (at thalweg) | Canopy Cover Partly open Partly shaded High Water Markm Proportion of Reach Represented by Stream Morphology Types Riffle% Run% Pool% Channelized Pes No Dam Present Pes No |
| LARGE WOODY DEBRIS | LWD 15 m² Density of LWDm²/km² (LWD/ reac | ih area) |
| AQUATIC VEGETATION | Indicate the dominant type and record the domin ☐ Rooted emergent ☐ Rooted submergent ☐ Attached Algae dominant species present Portion of the reach with aquatic vegetation | ☐ Rooted floating ☐ Free floating |
| WATER QUALITY | Temperature 2.2°C 54.02°F Specific Conductance 603 Dissolved Oxygen 2466 pH 821 57420 ug/L Turbidity 8.17 WQ Instrument Used Ashu ORP = 5106 | Water Odors Normal/None |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage Petroleum Chemical Anaerobic None Other Oils Absent Slight Moderate Profuse | Deposits Sludge Sawdust Paper fiber Sand Cher Looking at stones which are not deeply embedded, are the undersides black in color? Yes |

| INC | RGANIC SUBSTRATE (should add up to 1 | | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | | | | |
|-------------------|---|------------------------------------|--|----------------------------|-----------------------------------|--|--|--|
| Substrate Type | Diameter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | | |
| Bedrock | | <u> </u> | Detritus | sticks, wood, coarse plant | 70 | | | |
| Boulder | > 256 mm (10") | 5 | | materials (CPOM) | 20 | | | |
| Cobble | 64-256 mm (2.5"-10") | 20 | Muck-Mud | black, very fine organic | | | | |
| Gravel | 2-64 mm (0.1"-2.5") | 30 | | (FPOM) | | | | |
| Sand | 0.06-2mm (gritty) | 30 | Mari | grey, shell fragments | | | | |
| Silt | 0.004-0.06 mm | 10 |] | | | | | |
| Clay | < 0.004 mm (slick) | 5 | | | | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME RUSK CICK | LOCATION Station I Harmonie State Park |
|------------------------|--|
| STATION # RIVERMILE | STREAM CLASS |
| LAT LONG | RIVER BASIN |
| STORET# | AGENCY |
| INVESTIGATORS EDB, WGL | |
| FORM COMPLETED BY | DATE 4 27/04 REASON FOR SURVEY |

| 3 | Habitat Parameter | | Condition | Category | | |
|-------------------------------|---|---|---|--|--|--|
| | rarameter | Optimal | Suboptimal | Marginal | Poor | |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. | |
| reac | SCORE | | 61,516(0); (3.1); (10); (3.1) | | | |
| in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. | |
| ated | SCORE \6 | | | | | |
| Parameters to be evaluated in | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. | |
| eters | SCORE 17 | 20-19-18-20-18 | (24.45) | | | |
| Param | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. | |
| | score 13 | 26 july 48, 37, 37, 37, 6 | | | | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. | |
| | score 16 | 20 19: 18: 7 16 | 440,48 33337,78 | 0.27 2.77278 | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| _ Habitat | | Condition | Category | |
|---|--|--|--|--|
| Parameter | Optimal | Suboptimal | Marginal | Poor |
| 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| SCORE ZO | 20 10 18 12 016 | 15/16/12 11 | 16. 90 -8 7 - 6 | 35 74 5 7 (0.32.00) |
| 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note-channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| SCORE 18 | | \$6 :4 :12 :12 :50 | 10-22-11-15-4 | 4 4 AB (2 111) |
| 8. Bank Stability (score each bank) SCORE 6 (LB) SCORE 4 (RB) 9. Vegetative Protection (score each bank) Note: determine | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | |
| SCORE 6 (LB) | | | 44.00 | 7 20 P. 156 A |
| SCORE 4 (RB) | RIGHT SHOWS OF | Alleria Toron M | 14. (C) A. | |
| 9. Vegetative Protection (score each bank) Note: determine left or right side t facing downstrea | covered by native vegetation, including trees, understory shrubs, or nonwoody | covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant | patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation disruption of streamba vegetation is very high vegetation has been removed to 5 centimeters or less it average stubble height |
| SCORE 3 (LB) | | 383,597 536 | No. 44 62 | 12.00 |
| SCORE Z (RB |) Kighi Blank (40. 9) | 96 8 9 7 69 | 1975 N. S. | |
| 10. Riparian Vegetative Zone Width (score eac bank riparian zor | h lots, roadbeds, clear-cuts | | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation du to human activities. |
| SCORE (LB | THE RESIDENCE OF THE PARTY OF T | 8 7 6 8 99 99 7 | 55 44 48 | |

Total Score 133

M. W. W. J. J. J. J. J. V. S. G. S. V. J. V. S. G. S. V. J. J. V. S. G. S. V. J. J. V. S. G. S. V. J. V. S. J. V. J. V. S. G. S. V. J. J. V. S. G. S. V. J. J. V. S. G. S. V. J. J. V. S. J. V. J. V. S. J. V. S. J. V. J. V

A-10 Appendix A-1: Habitat Assessment and Physicochemical Characterization Field Data Sheets - Form 3

- ろらての = ほらしの する なる なる まる ろろ

Qualitative Habitat Evaluation Index Field Sheet QHEI Score RM: Rush Creek Stream: River Code: Date: 4/27/04 Station State Park Location: Harmonie Scorers Full Name: Ed Belmonte Affiliation: 1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN **TYPE** SUBSTRATE QUALITY Check ONE (OR 2 & AVERAGE) GRAVEL [7] Check ONE (OR 2 & AVERAGE) ☐ ☐-BLDR /SLBS[10] ■ ■ SAND [6] DO-BOULDER (9) -LIMESTONE [1] SILT: - SILT HEAVY [-2] Substrate □ □ BEDROCK[5] TILLS [1] COBBLE [8] SILT MODERATE [-1] HARDPAN [4] D DETRITUS[3] ■ -WETLANDS[0] ☐ -SILT NORMAL [0] ☐ ☐-ARTIFICIAL[0] 17 DD-MUCK [2] ☐ -HARDPAN [0] -SILT FREE [1] NOTE: Ignore Sludge Originating From Point Sources □ □-SILT [2] □ -SANDSTONE [0] EMBEDDED □ -EXTENSIVE [-2] Max 20 □ -RIP/RAP [0] NESS: ☐ -MODERATE [-1] NUMBER OF SUBSTRATE TYPES: **△**4 or More [2] ☐ -LACUSTRINE [0] NORMAL [0] (High Quality Only, Score 5 or >) □-3 or Less [0] -SHALE [-1] ☐-NONE [1] COAL FINES [-2] 2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or Cover TYPE: Score All That Occur (Structure) check 2 and AVERAGE) XPOOLS> 70 cm [2] UNDERCUT BANKS [1] ☐ - EXTENSIVE > 75% [11] OXBOWS, BACKWATERS [1] 14 OVERHANGING VEGETATION [1] X ROOTWADS [1] **M**- MODERATE 25-75% [7] AQUATIC MACROPHYTES [1] XSHALLOWS (IN SLOW WATER) [1] X BOULDERS [1] **□** - SPARSE 5-25% [3] LOGS OR WOODY DEBRIS [1] Max 20 X ROOTMATS [1] COMMENTS: ■ - NEARLY ABSENT < 5%[1]</p> 3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE) Channel **CHANNELIZATION SINUOSITY** DEVELOPMENT **STABILITY** MODIFICATIONS/OTHER ☐ - HIGH [4] - EXCELLENT [7] X - NONE [6] ☐ - HIGH [3] - SNAGGING - IMPOUND.

| M- MODERATE [3] | X - GOOD [5] | ☐ · RECOVERED [4] | MODERATE [2 |] - RELOCATION | ON ISLANDS | 16 |
|--|-----------------------------------|---|--|-----------------|---|------------|
| 🗖 - LOW [2] | D - FAIR [3] | ☐ · RECOVERING [3] | □ · LOW [1] | - CANOPY R | EMOVAL - LEVEED | Max 20 |
| ☐ - NONE [1] | II- POOR [1] | - RECENT OR NO RECOVERY [1] | : | ☐ - DREDGING | i □ - BANK SHAPING CHANNEL MODIFICATIONS | |
| COMMENTS: | | | | | | |
| 4]. RIPARIAN ZON | | | bank or check 2 and A LITY (PAST 100 Me | | nk) PRiver Right Looking BANK EROSION | |
| L R (Per Bank) | • | Predominant Per Bank | | ser in rations | L R (Per Bank) | Riparian |
| W- WIDE > 50m [| | ST, SWAMP [3] | • | TION:TILLAGE [1 | | 1 9 |
| -DD- MODERATE 10 | | B OR OLD FIELD [2] | | | - | 1 |
| □ - NARROW 5-10 | | | | | [0] -HEAVY/SEVERE[| 1]Max 10 |
| - VERY NARROW | <5 m[1] D D -FENC | ED PASTURE [1] | | ONSTRUCTION | | , |
| □ II - NONE [0] | | | | • | • | |
| COMMENTS: | | | | | | |
| | | | | | | |
| = | ND RIFFLE/RUN QU | | | | | Pool/ |
| MAX. DEPTH | | <u>HOLOGY</u> | CURRE | ENT VELOCITY | [POOLS & RIFFLES!] | Current |
| (Check 1 ONLY!) | (Check 1 | or 2 & AVERAGE) | | (Check All Th | | |
| □ - >1m [6] | POOL WIDT | H > RIFFLE WIDTH [2] | -EDDIES[1 | | DRRENTIAL[-1] | 9 |
| - 0.7-1m [4] | | H = RIFFLE WIDTH [1] | FAST[1] | | TERSTITIAL[-1] | Max 12 |
| [2] 0.4-0.7m [2] | -POOL WID | H < RIFFLE W. [0] | MODERAT | | TERMITTENT[-2] | |
| 0.2-0.4m [1]1 < 0.2m [POOL=0 | OMMENTS. | | E -SLOW [1] | - V | ERY FAST[1] | |
| - V.Zm [POOC=C | D COMMENTS:_ | | | | | |
| | | CHECK ONE C | R CHECK 2 AND | AVERAGE | | Riffle/Run |
| RIFFLE DEPTH | | | FLE/RUN SUBSTRAT | | LE/RUN EMBEDDEDNESS | [7]=72 |
| Best Areas >10 | | AX > 50 [2] STAE | BLE (e.g.,Cobble, B | oulder) [2] | ☐ - NONE [2] | |
| ☐ - Best Areas 5-10 | • • | |). STABLE (e.g.,Larg | | ⊯ €LOW [1] | Max 8 |
| □ · Best Areas < 5 | cm · | D -UNS | TABLE (Fine Gravel | ,Sand) [0] | - MODERATE [0] | Gradient |
| [RIFFLE=0] | | | | | - EXTENSIVE [-1] | |
| COMMENTS: | | | | NO RIFFLE [M | etric=0] | 16 1 |
| | | | a ^ | | | Max 10 |
| 6] GRADIENT (ft/ | /mi):DRAII | NAGE AREA (sq.mi.):_ | <u>। ਕਿਕ</u> %F | 2001: 40 | %GLIDE: | · · |
| ** Rest areas must be larme and | ough to support a population of n | Me-obilaste species | %F | RIFFLE: 20 | %RUN: 40 | |
| | | Jane de | | | | 06/24/01 |
| EPA 4520 | | | | | | 00/24/01 |
| | | | | | | |

Macrobenthos Qualitative Sample List

| 21 <u>1</u> 23 <u>1</u> | ORDER | | | | | | | |
|---|--|--|--|---------------------------------------|--|---|---|---|
| 23 [] | | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | 0.000 | Parasite |
| 23[] | Nematomorpha | | | | | | | |
| 23[] | Hydracarina- Trombidiformes | | | | | | | Predators/Paras |
| | Tubellaria | Planaria | | | 3 | 4 | 0.125 | Omnivore |
| | Portiera | Spongilidae | | | | | 0.000 | Filters |
| | | | Carbiaula | fluminea | | 3.2 | 0.000 | |
| 31 <u> </u> E | Pelecypoda | Corbiculidae | Corbicula | | | 3. <u>z</u> | | |
| | | Dreissenidae | Dreissena | polymorpha | 1 | | 0.000 | |
| - 1 | | Unionidae | Villosa | iris | | | 0.000 | Filters |
| ⊦ | | | · | | 17 | В | 1.417 | |
| 18 | | Sphaeriidae | | - | '' | | | |
| - 10 | Gastropoda | Ancylidae | | | | 6 | | Scrapers |
| 20 | | Lymnaeidae | | | 1 1 | 6.9 | 0.072 | Scrapers |
| -~⊦ | | Lymnaeidae | Fossaria | | | 6 | 0.000 | Scrapers |
| H | | | 1 Casalina | | 1 | В | 0.093 | Scrapers |
| 19 <u>L</u> | | Physidae | | | | | | |
| г | | Physidae | Physelia | | <u> </u> | 8 | 0.000 | Scrapers |
| - 1 | | Planorbidae | | | 1 | 7 | 0.000 | Scrapers |
| - 1- | ******* | | Planorbula | | t | 7 | 0.000 | Scrapers |
| L | | Planorbidae | Figure | | | | | Scrapers |
| L. | | Pleuroceridae | | | | | | |
| Г | | Bithyniidae | Bithynia | tentaculata | | | | Scrapers |
| ٠t | Annelida | Hirudinea | | | 3 | 10 | 0.313 | Gathers |
| | Allilenda | | | | 4 | | 0.000 | Gathers |
| 25 | | Oligochaeta | | <u> </u> | | | | |
| 26 JI | Decapoda | | | | | В | | Predators |
| 17[| Amphipoda | | | 1 | 25 | 4 | 1.042 | Shredders |
| | | Asellidae | | | | 8 | 0.000 | Shredders |
| | Isopoda | /Addikuae | | | | 8 | | Scavengers |
| Ľ | Ostracoda | 1 | | | | | | |
| П | Ephemeroptera | Caenidae | | I | i | 7 | 0.000 | Gathers |
| 13 | | Caenidae | Caenis | T | 1 1 | 3.1 | 0.032 | Gathers |
| 13 | | | | | | | | |
| L | | Ephemeridae | Hexagenia | | . | 3.6 | | Gathers |
| 15 | | Baetidae | Baetis | 1 | 1 | 3.1 | 0.032 | |
| 7 | | Baetidae | Baetis | brunneicolor | I Total | 4 | 0.000 | Gathers |
| ŀ | | | | | | 2.7 | | Gathers |
| L | | Baetidae | Baetis | intercalaris | | | | |
| | | Baetidae | Callibaetis | | L | 5.6 | | Gathers |
| ار, | | | Stenacron | T * · | 1 | 3.1 | 0.032 | Scrapers |
| 14 | | Heptageniidae | | -tid-sele | + | | | |
| - 1 | | Heptageniidae | Stenacron | gildersleevei | | 3.1 | | Scrapers |
| - 1 | | Heptageniidae | Stenonema | 1 | 1 | 4 | 0.000 | Scrapers |
| ŀ | | | Stenonema | evinuum | | 1.9 | 0.000 | |
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| ſ | | Isonychiidae | Isonychia | L | | 2 | | Filters |
| ı | | Leptohyphidae | Tricorythodes | | 1 | 2.7 | 0.000 | Gathers |
| ١, | | | | t | + | 7 | | Gathers |
| L | | Siphionuridae | <u> </u> | | + | | | |
| ı | . ——— | Ephemerellidae | Timpanoga | | | 1 | 0.000 | Gathers |
| - 1 | | Leptophiebiidae | | | [| 2 | 0.000 | Gathers |
| إي | 0-1 | | | · · · · · · · · · · · · · · · · · · · | 1 | | | |
| | Coleoptera | Dytiscidae | | | 1 | 5 | | Predators |
| 37 | | Gyrinidae | | 1 | | 55 | | Predators |
| - 1 | | Gyrinidae | Dineutus | | T T | 3.7 | | Predators |
| } | | | Dr. Gette | | 1 | 7 | | Predators |
| 33 | | Haliplidae | | | | | | |
| - [| | Dryopidae | | I | | 5 | 0.000 | Predators |
| 32 | | Elmidae | | | | 4 | 0.000 | Gathers |
| 32 | | | - | + | | | | |
| | | Psephenidae | Psephenus | | | 4 | | Scrapers |
| ı | | Hydrophiloidae | | 1 | | l . | 0.000 | Gathers |
| -1 | | Hydrophiloidae | Tropisternus | 1 | | T | 0.000 | Gathers |
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| ı | Megaloptera | Sialidae | L | | | | | |
| - 1 | | Corydalidae | Corydalus | 1 | 1 | 4 | 0.000 | Predators |
| - 1 | Trichoptera | Brachycentridae | Brachycentrus | 1 | | 1 | 0.000 | Filters |
| H | Triciloptera | | | | + | 1 3 | 0.000 | Carenara |
| ı | | Helicopsychidae | Helicopsyche | | | | 0.000 | Scrapers |
| - 1 | | Helicopsychidae | Helicopsyche | borealis | | 3 | 0.000 | Scrapers |
| 16 | | Hydropsychidae | | 1 | 1 4 | 4 | 0.167 | Filters |
| '" | | | Ukadana sa sa ka | | - · | 4 | | Filters |
| ı | | Hydropsychidae | Hydropsyche | | | | | |
| | | Hydropsychidae | Hydropsyche | betteni | | 4 | 0.000 | Filters |
| ı | | Hydropsychidae | Hydropsyche | scalaris | | 4 | 0.000 | Filters |
| - 1 | | | | | | 4 | | |
| | | Hydroneuchidea | Symphitoneuche | | | | 0.000 | |
| | | Hydropsychidae | Symphitopsyche | + | | | | Filters |
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| TAXA HICHNESS | 10 | |
|---------------------------------|-------|-------------------|
| FBI | 5.911 | |
| Scraper/Filter | 0.125 | |
| EPT/Chironomidae | 0.269 | |
| % Contribution of Dominant Taxa | 0.250 | |
| EPT Index | 4.000 | |
| Community Similarity Indices | 0.000 | Comm. Loss = 0 |
| • | 1.000 | Jaccard Coef. = 1 |
| CPOM | 0.250 | |
| Total Number Collected | 100 | |
| | | |

25

total shredders

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

| | | page of |
|------------------|---------------------|--|
| STREAM NAME Bor | - Creek | LOCATION County Line Rd |
| STATION# | RIVERMILE | STREAM CLASS |
| LAT | LONG | RIVER BASIN |
| STORET# | • | AGENCY |
| COLLECTED BY E > | B, WGL DATE 4/08/04 | LOT# |
| TAXONOMIST EST | 3 WGL DATE | SUBSAMPLE TARGET 🗆 100 🖸 200 🗘 300 🗘 Other |

| 0 | Organisms | | | LS | TI | TCR | 0 | rganisms | No. | LS | TI | TCR |
|---------------|--------------|----------|--------------|--------------|-------|------------|--------------------------------------|--|-------------|-----|-------|----------|
| Oligochaeta | ות נאין גאיל | <u>6</u> | 3 | A | wat | \ | Megaloptera | | | | | |
| Hirudinea | | | | | | | Coleoptera | | | | | |
| | | ~ | W . | ļ., | | | Halipidae | אורווא או או או או או | 8 | A | لبلاد | - (|
| Isopoda | אן און | <u> </u> |) 4 | A | mr | - | Elmidae Hund al lida | | 2 | A | WGL | 1 |
| Amphipoda | אין אין אין | N K | 3 2 | A | wer | , | Hydroph, I. dae Diptera Black Fly | M 2 | 5 | ī. | ω6L | ì |
| | | | | | | | Blood Fed | M UTUN UN U | 48 | I | wel | - |
| Decapoda | III | _0 | 18 | A | we | 1 | Brown | | X | I | W6L | - |
| Ephemeroptera | canid | O | 1 | ± | UGL | . V | crane bruiei:. | 11- tabanilae | 10 | 工 | W6L | |
| | Hept | _Ğ |) <u>*</u> | Ŧ | ١٥٠ | | Gastropoda LaFL | THE IN - Physidal | 8 | Α | w6L | 1 |
| • | Bretid | _Q | 1 | I | WGL | - | | | | | | - |
| | | | | | | | Pelecypoda | | | | | |
| Plecoptera | | | | | | | Figerna, 1 | WINTI (| 1 | A . | wal | |
| | | | | | | | Other Horse h | ir 11 (O |)- <u>Z</u> | A | wu | |
| | | | | | | | Argia- | 1 0 | X | Τ | ١٧٧١ | ` |
| richoptera | | | - | | | | phonatia | | B | A | WGL | \vdots |
| | | | <u> </u> | | | | Coen. 1, drayon Fly | 左右 | 18 | I | wu | 7 |
| | | | | | | | | | | | | |
| | | | | | | | | | , | | | |
| | | | | | | | | | | | | |
| lemiptera | | | | | | | | , | | | | |
| the striber | N | 0 | 8 | 1 | ساۋىد | ` | | | | | | |

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition - Form 3

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME Borr Ck | LOCATION Count | , line Rd | | | | |
|----------------------------|----------------------------|-------------------|--|--|--|--|
| STATION # Z RIVERMILE | STREAM CLASS | | | | | |
| LATLONG | RIVER BASIN | RIVER BASIN | | | | |
| STORET# | AGENCY | | | | | |
| INVESTIGATORS EXB, WGL | | LOT NUMBER | | | | |
| FORM COMPLETED BY ESB, WGL | DATE 4/28/64 TIME AM PM | REASON FOR SURVEY | | | | |
| | | | | | | |

| HABITAT TYPES | Indicate the percentage of each habitat type present Cobble / O % |
|----------------------|--|
| SAMPLE COLLECTION | Gear used D-frame kick-net Other |
| GENERAL COMMENTS | No Cadul Sties, backes Added from Feterence - Dragon Flies, Horse har, Isopols |

QUALITATIVE LISTING OF AQUATIC BIOTA

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare, 2 = Common, 3= Abundant, 4 = Dominant

| Periphyton | . 0 (T) | 2 | 3 | 4 | Slimes | <u></u> | 1 | 2 | 3 | 4 |
|-------------------|--------------|---|---|---|--------------------|---------|---|-----|---|---|
| Filamentous Algae | 0 💆 | 2 | 3 | 4 | Macroinvertebrates | 0 | 1 | 2 | 3 | 4 |
| Macrophytes | 0 (<u>1</u> | 2 | 3 | 4 | Fish | 0 | 1 | (2) | 3 | 4 |

FIELD OBSERVATIONS OF MACROBENTHOS

Indicate estimated abundance: 0 = Absent/Not Observed, 1 = Rare (1-3 organisms), 2 = Common (3-9 organisms), 3 = Abundant (>10 organisms), 4 = Dominant (>50 organisms)

| Porifera | 0 | 1 | 2 | 3 | 4 | Anisoptera | 0 | 1 | 2 | 3 | 4 | Chironomidae | 0 | 1 | 2 | 3 | 4 |
|-----------------|---|---|-----|---|---|-------------|---|---|---|---|---|---------------|---|---|---|---|---|
| Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygoptera | 0 | 1 | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes | 0 | 1 | 2 | 3 | 4 | Hemiptera | 0 | 1 | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Turbellaria | 0 | 1 | 2 | 3 | 4 | Coleoptera | 0 | 1 | 2 | 3 | 4 | Other | 0 | 1 | 2 | 3 | 4 |
| Hirudinea | 0 | 1 | 2 | 3 | 4 | Lepidoptera | 0 | 1 | 2 | 3 | 4 | , | | | | | |
| Oligochaeta | 0 | 1 | 2 | 3 | 4 | Sialidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Isopoda | 0 | 1 | . 2 | 3 | 4 | Corydalidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Amphipoda | 0 | 1 | 2 | 3 | 4 | Tipulidae | 0 | 1 | 2 | 3 | 4 | , ! | | | | | |
| Decapoda | 0 | 1 | 2 | 3 | 4 | Empididae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Gastropoda | 0 | 1 | 2 | 3 | 4 | Simuliidae | 0 | 1 | 2 | 3 | 4 | · | | | | | |
| Bivalvia | 0 | 1 | 2 | 3 | 4 | Tabinidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| ; | | | | | | Culcidae | 0 | 1 | 2 | 3 | 4 | | | • | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | | STREAM NAME R. | r creek | 1100 | CATION 54 | Hon 2 | | 1. 6.1 | | |
|-----------------------------|--|--|----------------------------|--------------------------------|--------------------|-----------------------|----------------------------|--|--|--|
| | | | IVERMILE | | REAM CLASS | FION ON | County | Line Rd | | |
| | | LAT 38' 8.349N L | | | | | | | | |
| | | STORET # | | | ENCY | | | | | |
| | | INVESTIGATORS | JB, WG. | | | | | | | |
| | | FORM COMPLETED BY | | DA' | TE 4/28/04 | REASON | FOR SURVEY | | | |
| | | EJE | 3, WGC | TIM | E 09.00 @ | РМ | | | | |
| | | |) | | | | | | | |
| | | WEATHER CONDITIONS | Now | | Past 24 hours | Has there be | een a heavy rain i I No | n the last 7 days? | | |
| | | | | storm (heav | y rain) | č | ature 22 °C | day Night | | |
| | | | | rain (steady showers (inter | rmittent) | Other | atti Comme | · | | |
| | | | % | %cloud co | | % Other | | | | |
| AB | _F4 | SITE LOÇATION/MAP | Draw a map | of the site and | indicate the areas | ampled (or atta | ch a photograph) | [· | | |
| TD | Pept | Velocity offer | DE TB. | DEPTH | velo 41/sed | DFLB | Depthis | Velocity ft/sec | | |
| 2.5 | 0.2 | .21 | 0,5 | 0.4 | (02) | 0.5 | 0,2 | 0.17 | | |
| 1,0 | 0,3 | 0.52 | 1,0 | 0.7 | 0.01 | 110 | 0.5 | 0.25 | | |
| 1.5 | 0,5 | 0.60 | 1.5 | 0.9 | 0.08 | 1.5 | 0.6 | 0.32 | | |
| ACRES AND ACTION OF PRESENT | tidl the section of t | 0,34 | 2,0 | 1.0 | 0.15 | 2.0 | 0.7 | 0,34 | | |
| 2.0 | - | | 2.5 | かっこ | 0.20 | | | | | |
| 2.5 | 0.5 | O. 41 | 3,0 | 1,3 | 0.28 | 312 | 0.8 | 0.42 | | |
| 3.0 | 0.7 | 0,93 | 3,5 | 1.3 | 0.32 | 3,0 | 0.9 | 0.54 | | |
| | | 1.05 | 4.0 | 1.3 | 0.35 | 3.5 | 0.9 | 0.63 | | |
| | .0.8 | The second secon | 4.5 | 1.2 | 0.45 | 4.0 | 1.0 | 0,58 | | |
| 4.0 | 0,9 | 0.94 | 5.0 5.5 | 1.2 | 0.47 | 4.5 | 1.0 | 0,61 | | |
| 4.5 | 0.9 | 0,64 | 9.0 | | 0,26 | 5.0 | 1.0 | 0.59 | | |
| 50 | 1.0 | 0,44 | 6.5 | 1.2 | 0,22 | 5.5 | 1.0 | 1 | | |
| 5.5 | 0,9 | 0,49 | 7.0 | 1.1 | 0,29 | 1 | - | 0,61 | | |
| , O | 0,9 | 0.41 | 7.5 | 8.0 | | 6.0 | 1.0 | 0.54 | | |
| | 0,8 | 0.21 | 8.0 | 0.5 | 0.36 | 6.5 | 0.9 | 0.41 | | |
| .5 | 0.6 | 0.12 | 8.5 | 0,2 | 0.32 | 7.0 RIG | HT BAN | K | | |
| <u>, G</u> | | | | <u> </u> | 0.42 | H | | | | |
| | 0.6 | 0.02 | 9,0 | 0.2 | 0.24 | | | | | |
| <u>. o</u> | 0,5 | (=0.03) | 9.5 | | COG. | \ | | The state of the s | | |
| . 5 | 0,4 | (-0.07) | 10' RT,BA | | I | | | l | | |
| | | STREAM CHARACTERIZATION | Stream Subsys Perennial | stem □ Intermitte | nt 🗅 Tidal | Stream Type Coldwater | Warmwater | , | | |

2.0

2.5

10 FT - PT

BANK

Spring-fed
Mixture of origins
Other

Catchment Area

Stream Origin

Glacial
Non-glacial montane
Swamp and bog

Station 2 Barr Creek County Line Rd

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSHED FEATURES RIPARIAN VEGETATION (18 meter buffer) | Forest | |
|--|---|--|
| (18 meter buffer) INSTREAM FEATURES | dominant species present Estimated Reach Length Estimated Stream Width Sampling Reach Area Area in km² (m²x1000) Estimated Stream Depth Surface Velocity (at thalweg) | |
| LARGE WOODY DEBRIS AQUATIC VEGETATION | LWDm² Density of LWDm²/km² (LWD/ reach area) Indicate the dominant type and record the dominant spec Rooted emergent | □ Rooted floating □ Free floating |
| WATER QUALITY | Dissolved Oxygen 63252 Petr Dissolved Oxygen 63252 Water Slic Nor Turbidity 6.65 | Odors mal/None |
| SEDIMENT/ SUBSTRATE | Chemical Anaerobic None Rel | sits dge Sawdust Paper fiber Sand ict shells Other ing at stones which are not deeply dded, are the undersides black in color? |

| INO | RGANIC SUBSTRATE (should add up to | | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | | | | |
|-------------------|------------------------------------|------------------------------------|--|----------------------------|-----------------------------------|--|--|--|
| Substrate Type | Diameter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | | |
| Bedrock | | | Detritus | sticks, wood, coarse plant | ١ ح | | | |
| Boulder | > 256 mm (10") | 5 | 1 | materials (CPOM) | \ | | | |
| Cobble | 64-256 mm (2.5"-10") | 10 | Muck-Mud | black, very fine organic | | | | |
| Gravel | 2-64 mm (0.1"-2.5") | 15 | | (FPOM) | | | | |
| Sand | 0.06-2mm (gritty) | 20 | Marl | grey, shell fragments | | | | |
| Silt | 0.004-0.06 mm | 30 | | | | | | |
| Clay | < 0.004 mm (slick) | 30 | | | | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME BOTT Creek | LOCATION Station | a, county line Rd |
|-----------------------------|---------------------------------|-------------------|
| STATION # 2 RIVERMILE | STREAM CLASS | |
| LATLONG | RIVER BASIN | |
| STORET# | AGENCY | |
| INVESTIGATORS ESB, WGL | | |
| FORM COMPLETED BY ESB, WG-L | DATE 4/26/04 TIME 10:30 M PM | REASON FOR SURVEY |

| : | Habitat Parameter | | Condition | Category | |
|--|---|---|---|--|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| reac | SCORE 10 | 20, 19 : 18 517 16 | . 15% 14 - 13, 4027, 4 .5 | 10) 36 (48) 27 (48) | 5.442.76.22.378 |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock, no root mat or vegetation. |
| ated | SCORE 7 | 20] 10 18 17 16 | 15 14 H3 E92 ATH | 10.2018.636 | 5 4:032,12,13.00 |
| to be evalu | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ters | SCORE 6 | 20 19 18 17 16 | ie sie saangeb | 0 9 8 25 16 | 4 2 3 3 7 2 3 3 3 |
| Parame | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | SCORE 5 | 20 A9 A8 A17 46. | 915 (14) (13 6 /2 (4) | 40 170 to 8 steel 26. | (5) P. (4) (4) (5) (5) (6) |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| | SCORE 16 | 20 19 18 17 76 | 15", 14", [13, 712], (8) | 10 9 8 7 76 | 5-4.3.2.156 |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat | | Condition | Category | |
|---|--|--|--|---|---|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| | SCORE 8 | 20 19 18 17 16 | 15 (14 (18 - 12 - 11) | 10 - 9 (8) 7 - 6 | 3 246 3 - 2 - 1 - 0 |
| sampling reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| samı | SCORE 3 | 20° 19° 18° 174.46 | 15 14 :13 12 :11 | 10, 91, 18 - Timbe | 5 4 (0) 2 1 70 |
| Parameters to be evaluated broader than | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| alua | SCORE (LB) | LeffBank v 402.93 | * a * 7 | 5 12 | 2 . On 20. |
| pe ev | SCORE(RB) | Right Bank 1940 / 5* | 38.00 7 1565 W | 185 254-1 1864 | 25 (Fig. 1996) |
| Parameters to | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE <u>5</u> (LB) | Len Bank 3 10 39 | 758 CON 7 - 36 | (C) ** ** | 2 2 5 East 052 |
| 1. | SCORE 4 (RB) | Rights Bank B. Miles 9 | | | |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE (LB) SCORE (RB) | keft Bank 10 9 Right Bank 10 9 | 28 1 7 62 28 7 6 | 13 947 77 | 25 (1) (1) (1) (1) |

Total Score 68

| 1/2 | |
|-----|--|
| | |

Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

| D-HARDPAN [4] D-DETRITUS[3] D-WETLANDS[0] D-SILT NORMAL [0] D-MUCK [2] D-ARTIFICIAL[0] D-HARDPAN [0] D-SILT FREE [1] D-SILT FREE [1] | ostrate |
|--|-------------------------|
| COPER Full Name: Affiliation: \SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present PE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN G-BLDR /SLBS[10] | 10 |
| SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present PE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY | 10 |
| PE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY | 10 |
| Check ONE (OR 2 & AVERAGE) Ch | 10 |
| D-BOULDER [9] D-SAND [6] D-LIMESTONE [1] SILT: D-SILT HEAVY [-2] D-COBBLE [8] D-BEDROCK[5] D-VILLS [1] D-SILT MODERATE [-1] Substitution of the company of t | 10 |
| DECOBBLE [8] DEBEDROCK[5] DESILT MODERATE [-1] Sub- DEHARDPAN [4] DEDETRITUS[3] DESILT NORMAL [0] DESILT FREE [1] DESILT [2] SUB- DEMUCK [2] DETARTIFICIAL[0] DESILT FREE [1] DESILT [2] DESILT MODERATE [-1] DESILT NORMAL [0] DESILT NORMAL [0] DESILT NORMAL [0] DESILT FREE [1] DESILT FREE | 10 |
| D-HARDPAN [4] D-DETRITUS[3] D-WETLANDS[0] D-SILT NORMAL [0] D-MUCK [2] D-ARTIFICIAL[0] D-HARDPAN [0] D-SILT FREE [1] D-SILT [2] SQ NOTE: Ignore Sludge Originating From Point Sources D-SANDSTONE [0] EMBEDDED D-EXTENSIVE [-2] Ma JABBER OF SUBSTRATE TYPES: D-4 or More [2] D-LACUSTRINE [0] D-NORMAL [0] Igh Quality Only, Score 5 or >) D-3 or Less [0] D-SHALE [-1] D-SHALE [-1] | |
| D-MUCK [2] | |
| JMBER OF SUBSTRATE TYPES: | эх 20 |
| JMBER OF SUBSTRATE TYPES: 124 or More [2] | |
| ligh Quality Only, Score 5 or >) | |
| | |
| #WMEN 1.2 | |
| INICEDEAL COLUMN | - |
| INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE) | over |
| | |
| COVERHANGING VEGETATION [1]ROOTWADS [1]AQUATIC MACROPHYTES [1] MODERATE 25-75% [7] | 6 |
| | ax 20 |
| ROOTMATS [1] COMMENTS: ——————————————————————————————————— | |
| CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE) | |
| STATE TO STATE STA | annel |
| - HIGH [4] - EXCELLENT [7] - NONE [6] - HIGH [3] - SNAGGING - IMPOUND. | ١ |
| - MODERATE [3] | |
| No. of the Control of | ax 20 |
| - NONE [1] - DREDGING - BANK SHAPING RECOVERY [1] - ONE SIDE CHANNEL MODIFICATIONS | |
| DAMENTS: | |
| . RIPARIAN ZONE AND BANK EROSION check ONE box per bank or check 2 and AVERAGE per bank) PRiver Right Looking Dow | vnstrear |
| RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION PLO | parian |
| R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank) | |
| | 3 |
| D-MODERATE 10-50m [3] DICHSHRUB OR OLD FIELD [2] DICHSHRUB OR INDUSTRIAL [0] DICHEAVY/SEVERE[1] MARROW 5-10 m [2] DICHEAVY/SEVERE[1] MARROW 5-10 m [2] |) av 10 |
| NARROW 5-10 m [2] THESIDENTIAL, PARK, NEW FIELD [1] OPEN PASTURE, ROWCROP [0] II - HEAVY/SEVERE[1] HEAVY/SEVERE[1] III - HEAVY/SEVERE[1] HEAVY/SEVERE[1] III - HEAVY/SEVERE[1] IIII - HEAVY/SEVERE[1] IIII - HEAVY/SEVERE[1] IIIII - HEAVY/SEVERE[1] IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII | AA 10 |
| II - NONE [0] | |
| | |
| DMMENTS: | |
| | |
| POOL/GLIDE AND RIFFLE/RUN QUALITY | Pool/ |
| POOL/GLIDE AND RIFFLE/RUN QUALITY AX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Cu | Pool/ urrent |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY Check 1 ONLY!) (Check 1 or 2 & AVERAGE) Check 1 ONLY!) (Check 1 or 2 & AVERAGE) Check 2 ONLY!) (Check 2 ONLY!) | |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH Check 1 ONLY!) (Check 1 or 2 & AVERAGE) - >1m [6] CURRENT VELOCITY [POOLS & RIFFLES!] Current velocity (Check All That Apply) - >1m [6] CURRENT VELOCITY [POOLS & RIFFLES!] Current velocity (Check All That Apply) - >1m [6] COURTENT VELOCITY [POOLS & RIFFLES!] Current velocity (Check All That Apply) | |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH Check 1 ONLY!) (Check 1 or 2 & AVERAGE) - > 1m [6] - POOL WIDTH = RIFFLE WIDTH [1] - 0.7-1m [4] - POOL WIDTH = RIFFLE WIDTH [1] ME CURRENT VELOCITY [POOLS & RIFFLES!] | |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH | urrent |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH Check 1 ONLY!) (Check 1 or 2 & AVERAGE) - > 1m [6] - POOL WIDTH = RIFFLE WIDTH [1] - 0.7-1m [4] - POOL WIDTH = RIFFLE WIDTH [1] ME CURRENT VELOCITY [POOLS & RIFFLES!] | urrent |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH | ax 12 |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH | urrent |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH | ax 12 |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Current velocity [Poo | ax 12 |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Curren | ax 12 |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Current velocity Pools & Riffles!] Max velocity Pools & Riffles!] Current velocity Pools & Riffles!] Max velocity Pools & Riffles!] Current velocity Pools & Riffles!] Max velocity Pools & Riffles!] Max velocity Pools & Riffles!] Pools & Riffles!] Current velocity Pools & Riffles!] Max velocity Pools & Riffles!] Po | ax 12 |
| POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Current Velocity [Poo | ax 12 |
| POOL/GLIDE AND RIFFLE/RUN QUALITY AXX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Current Velocity Pools & Riffles!] Curren | fle/Run ax 8 iradient |
| POOL/GLIDE AND RIFFLE/RUN QUALITY AXX. DEPTH MORPHOLOGY CURRENT VELOCITY [POOLS & RIFFLES!] Current Velocity Pools & Riffles!] Curren | fle/Run siradient |

Vial#

Macrobenthos Qualitative Sample List

| 21 | | | | | | TALED ANDE VALUED | EDI I | |
|--|---|--|--|--|------------|---|--|--|
| [| ORDER | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | | D |
| | Nematomorpha | | | | | | 0.000 | Parasite Predators/Parasite |
| | Hydracarina-Trombidiformes | Di di | | | 3 | 4 | | Omnivore |
| | Tubellaria | Planaria | | | -3 | | 0.000 | |
| | Porifera | Spongillidae | A 11 1 | ft | - | 3.2 | 0.000 | |
| 31 | Pelecypoda | Corbiculidae | Corbicula | fluminea | | 3.2 | 0.000 | |
| - 1 | | Dreissenidae | Dreissena | polymorpha | | | 0.000 | |
| ı, | | Unionidae | Villosa | iris | | 8 | 0.516 | |
| 18 | | Sphaeriidae | | | 6 | | | |
| | Gastropoda | Ancylidae | | | | 6 | | Scrapers |
| 20 | | Lymnaeidae | | | | 6.9 | | Scrapers |
| ١ | | Lymnaeidae | Fossaria | | | 6 | 0.000 | Scrapers |
| 19 | | Physidae | | | 4 | 8 | | Scrapers |
| ļ | | Physidae | Physella | | | | 0.000 | Scrapers Scrapers |
| | | Planorbidae | | | | 7 | 0.000 | Scrapers |
| ļ | | Planorbidae | Planorbula | | | | | Scrapers |
| | | Pleuroceridae | Dahrein | tentaculata | | | | Scrapers |
| | | Bithyniidae | Bithynia | ternaculata | | 10 | | Gathers |
| 25 | Annelida | Hirudinea | ,, | | 6 | | | Gathers |
| | Decapoda | Oligochaeta | | | 1 | 8 | | Predators |
| 17 | Amphipoda | | | | 10 | 4 | 0.430 | Shredders |
| 24 | isopoda | Asellidae | | | 5 | 8 | | Shredders |
| -7 | Ostracoda | 710011010 | 1-114 | | | В | | Scavengers |
| | Ephemeroptera | Caenidae | | | | 7 | | Gathers |
| 13 | Epitomoreptera | Caenidae | Caenis | | 1 | 3.1 | 0.033 | Gathers |
| . ' | | Ephemeridae | Hexagenia | | | 3.6 | 0.000 | Gathers |
| 15 | · | Baetidae | Baetis | | 1 | 3.1 | | Gathers |
| '3 | | Baetidae | Baetis | brunneicolor | | 4 | | Gathers |
| - 1 | | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| | | Baetidae | Callibaetis | | | 5.6 | | Gathers |
| 14 | | Heptageniidae | Stenacron | | 1 | 3.1 | 0.033 | Scrapers |
| '7 | | Heptageniidae | Stenacron | gildersleevei | r | 3.1 | 0.000 | Scrapers |
| 1 | | Heptageniidae | Stenonema | 1 | | 4 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | exiguum | | 1.9 | | Scrapers |
| | | Isonychiidae | Isonychia | T | | 2 | | Filters |
| | | Leptohyphidae | Tricorythodes | 1 | | 2.7 | | Gathers |
| | | Siphlonuridae | | 1 | | 7 | | Gathers |
| | | Ephemerellidae | Timpanoga | 1 | | 1 | | Gathers |
| | | Leptophlebiidae | | | | 2 | | Gathers |
| 8.9 | Coleoptera | Dytiscidae | | | | 5 | 0.000 | Predators |
| 37 | | Gyrinidae | 1 | | | 5 | 0.000 | Predators |
| - | | Gyrinidae | Dineutus | 1 | | 3.7 | | Predators |
| 27,33 | | Haliplidae | | | 17 | 7 | 1.280 | Predators |
| . | | Dryopidae | | 1 | | 5 | 0.000 | Predators |
| 28,32 | | Elmidae | | | 1 | 4 | 0.043 | Gathers |
| | | Psephenidae | Psephenus | | | 4 | 0.000 | Scrapers |
| | | Hydrophiloidae | | | | | 0.000 | Gathers |
| 7 | | Hydrophiloidae | Tropistemus | | 1 | | 0.000 | Gathers |
| | Megaloptera | Sialidae | | | | 4 | | Predators |
| | | Corydalidae | Corydalus | | | 4 | 0.000 | Predators |
| | Trichoptera | Brachycentridae | Brachycentrus | | | 1 | | Filters |
| | | Helicopsychidae | Helicopsyche | | | 3 | | Scrapers |
| | | Helicopsychidae | Helicopsyche | borealis | | 3 | | Scrapers |
| 16 | | Hydropsychidae | <u> </u> | | | 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | | | 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | betteni | | 4 | 0.000 | Filters |
| | | Hydropsychidae | Hydropsyche | scalaris | 1 | 4 | | Filters |
| | | Hydropsychidae | Symphitopsyche | | | 4 | | Filters |
| | | Hydroptilidae | | | ļ | 4 | | Gathers |
| | | Hydroptilidae | Hydroptila | | | 3.2 | | Gathers |
| | | Leptoceridae | | | | 4 | | Shredders |
| | | Leptoceridae | Nectopsyche | | | 6 | 0.000 | Shredders |
| | | Molannidae | l . | _ | | | | Cathora |
| | | Philopotamidae | L | • | | | 0.000 | Gathers |
| | | | | | | 3 | 0.000 | Filters |
| | ļ | Phryganeidae | Hagenella | | | 3 4 | 0.000 0.000 0.000 | Filters Shredders |
| | | Polycentropodidae | Cyrnellus | | | 3 4 6 | 0.000 0.000 0.000 | Filters Shredders Filters |
| | | Polycentropodidae Psychomyiidae | | | | 3 4 | 0.000 0.000 0.000 0.000 | Filters Shredders Filters Gathers |
| 36 | Hemiptera | Polycentropodidae Psychomyiidae Belostomatidae | Cyrnellus Lype | | | 3 4 6 | 0.000 0.000 0.000 0.000 0.000 | Filters Shredders Filters Gathers Predators |
| | Hemiptera | Polycentropodidae Psychomyidae Belostomatidae Belostomatidae | Cyrnellus | | | 3 4 6 2 | 0.000 0.000 0.000 0.000 0.000 0.000 | Filters Shredders Filters Gathers Predators Predators |
| 34 | | Polycentropodidae Psychomylidae Belostomatidae Belostomatidae Corixidae | Cyrnellus Lype | | | 3 4 6 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Filters Shredders Filters Gathers Predators Predators Predators |
| | | Polycentropodidae Psychomylidae Belostomatidae Belostomatidae Corixidae Gerridae | Cyrnellus Lype Belostoma | | 1 | 3 4 6 2 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Filters Shredders Filters Gathers Predators Predators Predators Predators Predators |
| 34 | | Polycentropodidae Psychomylidae Belostomatidae Belostomatidae Coriodae Gerridae Gerridae | Cyrnellus Lype Belostoma Trepobates | | 1 | 3 4 6 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.005 0.054 | Filters Shredders Filters Gathers Predators Predators Predators Predators Predators Predators Predators |
| 34 | | Polycentropodidae Psychomylidae Belostomatidae Belostomatidae Corkidae Gerridae Gerridae Notonectidae | Cyrnellus Lype Belostoma | | 1 | 3 4 6 2 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.054 0.054 | Filters Shredders Filters Gathers Predators Predators Predators Predators Predators Predators Predators Predators |
| 34 | | Polycentropodidae Paychomylidae Belostomatidae Belostomatidae Cortidae Gerridae Gerridae Notonectidae Nopidae | Cyrnellus Lype Belostoma Trepobates Notonecta | | 1 | 3 4 6 2 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.054 0.000 0.000 | Filters Shredders Filters Gathers Predators |
| 34 | | Polycentropodidae Psychomykidae Belostomatidae Belostomatidae Cortidae Gerridae Gerridae Notoneckdae Notoneckdae Nepidae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra | | 1 | 3 4 6 2 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.054 0.000 0.000 0.000 | Fitters Shredders Fitters Gethers Predators |
| 34 | | Polycentropoddae Peychomyidae Bebstormatidae Belsotormatidae Corrixdae Gerridae Gerridae Notonectidae Nepidae Peridae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta | | 1 | 3 4 6 2 2 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Fitters Shredders Fitters Gathers Predators |
| 34 | | Polycentropodidae Psychomykidae Belostomatidae Belostomatidae Corridae Gerridae Gerridae Gerridae Notonectidae Negridae Negridae Peridae Peridae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra | | 1 | 3 4 6 2 2 10 5 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Fitters Shredders Fitters Gathers Predators |
| 34 | Piecoptera | Polycentropodidae Psychomylidae Belostomatidae Belostomatidae Belostomatidae Corridade Gerridae Gerridae Netionsectidae Nepidae Peridae Peridae Chiroperidae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta | | 1 | 3 4 6 2 2 10 5 5 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Fitters Shredders Fitters Gathers Predators |
| 34 | | Polycentropodidae Peychomylidae Babatomatidae Babatomatidae Bebatomatidae Corhidae Gerridae Gerridae Notonectidae Nepidae Peridae Peridae Choroperidae Aeshnidae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia | | 1 | 3 4 6 2 2 10 5 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Fitters Shredders Fitters Gathers Predators |
| 34 | Piecoptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Corividae Gerridae Gerridae Notonectidae Nepidae Periliae Periliae Chiroperidae Aeshnidae Aeshnidae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta | | 1 | 3 4 6 2 2 10 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0 | Filters Shredders Filters Gethers Gethers Predators |
| 34 | Piecoptera | Polycentropodidae Peychomylidae Babatomatidae Babatomatidae Babatomatidae Corhidae Gerridae Gerridae Gerridae Notonectidae Nepidae Perildae Chibroperidae Aeshnidae Aeshnidae Aeshnidae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia | -1-1 | 1 | 3 4 6 2 2 10 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0 | Filters Gathers Gathers Filters Gathers Predators |
| 34 | Plecoptera Odonata-Anisoptera | Polycentropodidae Peychomylidae Bebistomatidae Bebistomatidae Bebistomatidae Corividae Gerridae Gerridae Netonactidae Nepidae Perridae Perridae Chioroperidae Aeshnidae Aeshnidae Gomphidae Cordulegastridae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia | | | 3 4 4 6 6 2 2 110 5 5 5 5 1 1 1 1 3 3 3 3 1 1 3 3 3 3 | 0.0000 0.0000 0.00 | Filters Shredders Filters Gatthers Predators |
| 34 | Plecoptera Odonata-Anisoptera | Polycentropodidae Peychomylidae Babstomatidae Babstomatidae Babstomatidae Corbidae Gerridae Gerridae Notonectidae Nepidae Peridae Peridae Chloroperidae Aeshnidae Aeshnidae Corduliegastridae Corduliegastridae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia | | 1 | 3 4 6 2 2 10 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 | Filters Shredders Filters Gethers Predators |
| 34 | Plecoptera Odonata-Anisoptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Corridae Gerridae Gerridae Notonecidae Nepidae Nepidae Perridae Chioroperidae Aeshnidae Aeshnidae Gomylidae Corduligastridae Corduligastridae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia | | | 3 4 6 6 2 2 110 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 | Filters Shredders Filters Gatthers Predators |
| 34 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Balostomatidae Balostomatidae Balostomatidae Gerridae Gerridae Gerridae Notonecitidae Nepidae Perildae Chioroperidiae Choroperidiae Choroperidiae Condulagastridae Cordulagastridae Cordulidae Libelulidae Laciopterypidae | Cyrnellus Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia | | | 3 4 6 2 2 110 5 5 5 1 1 1 1 3 3 3 3 1 1 3 3 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 | Filters Shredders Filters Gethers Predators |
| 34 3 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Corridae Gerridae Gerridae Notonectidae Nepidae Perlidae Perlidae Perlidae Chioroperlidae Aeshnidae Gomylidae Cordulegastridae Loelulegastridae Loelulegastridae Cardulidae Loelulidae Loelulidae Calopterygidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena | | | 3 4 6 2 2 2 110 5 5 5 5 1 1 1 1 3 3 3 3 1 1 3 5 9 9 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gethers Predators |
| 34 3 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Psychomylidae Balostomatidae Balostomatidae Balostomatidae Balostomatidae Corividae Gerridae Gerridae Notonecitidae Nepidae Perildae Chioroperidae Chioroperidae Aeshnidae Aeshnidae Cordulegastridae Cordulegastridae Cordulegastridae Calopterypidae Calopterypidae Coonagronidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Ranatra Neopería Boyeria Caloptery: | | 4 | 3 4 6 6 2 2 110 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gethers Predators |
| 34 3 22 4 6 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Babatomatidae Babatomatidae Babatomatidae Corbidae Gerridae Gerridae Respective Respectiv | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena | | 4 | 3 4 6 2 2 100 5 5 5 5 1 1 1 1 3 3 3 3 1 1 1 3 3 5 5 9 9 5 5 3.7 6.1 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gathers Gathers Fredators Predators |
| 34 3 22 4 6 5 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Belostomatidae Gerridae Gerridae Gerridae Notonecidae Nepidae Peridae Chiroperidae Chiroperidae Controlae Asshnidae Asshnidae Cordulidae Lbelluidae Lbelluidae Calopterypidae Calopterypidae Coenagronidae Coenagronidae Coenagronidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 10 5 5 5 1 1 1 3 3 3 5 5 5 7 6 1 1 9 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gethers Gethers Predators |
| 34 3 22 4 6 5 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Babatomatidae Babatomatidae Babatomatidae Corbidae Gerridae Gerridae Respective Respectiv | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 3 4 6 2 2 110 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gatthers Predators |
| 34 3 22 4 6 5 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Babatomatidae Babatomatidae Babatomatidae Gerridae Gerridae Gerridae Notonectidae Nepidae Perildae Chloroperidae Aeshnidae Aeshnidae Gomphidae Cordulidae Libelluidae Calopterygidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 10 5 5 5 1 1 1 3 3 3 5 5 5 7 6 1 1 9 | 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gethers Gethers Predators Gathers Gathers Gathers Gathers |
| 34 3 22 4 6 5 30 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera Diptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Belostomatidae Gerridae Gerridae Gerridae Notonecidae Nepidae Perlidae Chiroperidae Chiroperidae Controlae Aeshnidae Aeshnidae Cordulidae Lübeliulidae Cardulidae Cardulidae Cacopterypidae Calopterypidae Coenagronidae Coenagronidae Coenagronidae Lestidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 3 4 6 2 2 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gatthers Predators Gathers Gathers Gathers Gathers |
| 34 3 22 4 6 5 30 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera Diptera | Polycentropodidae Peychomylidae Babatomatidae Babatomatidae Babatomatidae Gerridae Gerridae Gerridae Notonectidae Nepidae Peridiae Peridiae Chiroperidiae Aeshnidae Aeshnidae Aeshnidae Cordulidae Libelluidae Libelluidae Cordulidae Colopteryidiae Coenagrionidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 3 4 6 2 2 110 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Getthers Predators Fredators Getthers Gatthers Gatthers Gatthers Gatthers Gatthers Gatthers Gatthers Gatthers Gatthers |
| 22 4 6 5 30 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera Diptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Belostomatidae Gerridae Gerridae Gerridae Netronectidae Nepidae Perlidae Perlidae Chioroperidae Aeshnidae Aeshnidae Cordulegastridae Cordulegastridae Cordulegastridae Cordulegastridae Cordulegastridae Condiportidae Colopterygidae Colopterygidae Coenagronidae Coenagronidae Coenagronidae Lestidae Lestidae Certatopogonidae Lestidae Certatopogonidae Dioci-red Chironomidae Other Chironomidae Culicidae Simulidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 3 4 6 2 2 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gatthers Predators Fredators F |
| 344 3 222 4 6 5 30 11 12 35 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Basistomatidae Basistomatidae Basistomatidae Gerridae Gerridae Gerridae Notonecitidae Nepidae Perildae Nepidae Perildae Chioroperidae Aeshnidae Gomphidae Cordulidae Libelluidae Libelluidae Calopterygidae Coenagrionidae Coenagrionidae Lestidae Lestidae Lestidae Lestidae Lestidae Coenagrionidae Coenagrionidae Lestidae Lestidae Certal Coenagrionidae Lestidae Lestidae Coenagrionidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 | 3 4 6 2 2 110 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gethers Predators Fredators |
| 344 3 222 4 6 5 30 11 12 35 10 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera Odonata-Zygoptera | Polycentropodidae Peychomylidae Belostomatidae Belostomatidae Belostomatidae Belostomatidae Gerridae Gerridae Gerridae Netronectidae Nepidae Perlidae Perlidae Chioroperidae Aeshnidae Aeshnidae Cordulegastridae Cordulegastridae Cordulegastridae Cordulegastridae Cordulegastridae Condiportidae Colopterygidae Colopterygidae Coenagronidae Coenagronidae Coenagronidae Lestidae Lestidae Certatopogonidae Lestidae Certatopogonidae Dioci-red Chironomidae Other Chironomidae Culicidae Simulidae | Cyrnelius Lype Belostoma Trepobates Notonecta Ranatra Periesta Neoperia Boyena Caloptery: Argia | | 4 4 24 6 2 | 3 4 6 2 2 110 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Filters Shredders Filters Gatthers Predators Fredators F |

| TAXA RICHNESS | 21 |
|---------------------------------|-------|
| FBI | 6.592 |
| Scraper/Filter | 0.625 |
| EPT/Chironomidae | 0.100 |
| % Contribution of Dominant Taxa | 0.240 |
| EPT Index | 3.000 |
| Community Similarity Indices | 0.238 |
| | 0.538 |
| | |

Comm. Loss = 0.238 Jaccard Coef. = 0.538

| BENT | HIC MACE | ROIN | VER | TEE | RAT | TE L | ABORATO | RY BENC | | EET page | (FR | ONT of |) . |
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| STREAM NA | ME Barr | Cre | ek | | | | LOCATION | Upstream | | | · u/ | B., | Cree |
| STATION #_ | | | RIVE | RMIL | .E | | STREAM CL | • | | | , | , | |
| LAT | | | LON | G | | | RIVER BASI | IN . | | | | - | |
| STORET# | | | | | | | AGENCY | | | | | | |
| COLLECTE | BY EJB, | woo | _ | DAT | Е <i>4/</i> 3 | 29/04 | LOT# | • | | | | | |
| TAXONOMI | ST EJB, U | 166 | | DAT | E | | SUBSAMPL | E TARGET 🔾 | 100 🗅 2 | 200 🗆 3 | 300 🗆 | Other | |
| | • | Ente | r Fami | ly and | l/or Ge | enus an | d Species name | on blank line | | | | | |
| (| Organisms | | No. | LS | TI | TCR | 0 | rganisms | | No. | LS | т | TCR |
| Oligochaeta | m | 0 | 8 | A | UGL | 1 | Megaloptera | | | | | | |
| Hirudinea | | | | | | | Coleoptera Dy | tisciler - | · (0 | 1 | A | wcL | <i>j</i> |

| | - 8 | | | | | | | - Barriorito | 110. | | <u> </u> | 1010 | i |
|---------------|----------|-----|---|-------|----------|------|-------------------------------|---|--------|--------------|----------|-----------|----|
| Oligochaeta |)D | 0 | 8 | A | UGL | 1 | Megaloptera | | | | | | |
| Hirudinea | | | | | | | Coleoptera D | 1201016 | | A | | | |
| | | | | | <u> </u> | | Halpidae | tiscider -1 (0) | Z | A | WGL | | |
| Isopoda | 1) | 0 | 1 | 4 | WGL | 1 | | <u> </u> | | - | ساة مب | | |
| Amphipoda | HILL HI | (9 | A | Ā | WGL | - | Diptera Simul | ו נפיי באירו ונא באיו גאו | 26 | I | wa | , (| 12 |
| | /// | | | , | | | Bromv | Mr I 141 141 411 141 141 141 1 | A CO | I I | V6L | | 35 |
| Decapoda | 11 | D | 1 | A | WGL | 1 | Blood Rad | THE THE THE THE THE | مولا | H | wa | , | Ð |
| | | | | | | (| large larval | (D) | X | (<u>+</u>) | WGL | / | |
| Ephemeroptera | Hept1 | 0 | 1 | I | WBL | 1.7 | 11.7 | | | | | | ı |
| | Gail-111 | 0 | 1 | 工 | 466 | 1 | Gastropoda | Physidae T | 8 | A | WbL | 1 | l |
| • | | | | | | | | Physimer | | | | | l |
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| D1 . | | | | | | | Pelecypoda Fur Asm Clan | | | | igwdown | \square | I |
| Plecoptera | | | | | | _ | Asm Clan | mili 3 | 8 | Α | WGL | | l |
| | <u> </u> | | | | | | Other Diagnatly | Du mumm | 1 | Ī | 461 | | I |
| | | | | | | | | MT 1111 - E vellen | | T | 461 | 1 | 4) |
| | | | | | | | Damsel Fly Argue | | Z | ī | WGL | 7 | シ |
| Trichoptera | | | | | | | 1.1. | | | | | | l |
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| Hemiptera | | | | | | | | | | | | | |
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| | | ليب | | أجبيا | لبيا | لببا | | | لــــا | لِبِي | ليبيا | لـــــا | |

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

| otal No. Organisms | - (100) | Total No. Taxa | PB |
|--------------------|---------|----------------|----|
|--------------------|---------|----------------|----|

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME | Bar | <u> </u> | (~ | و (| | | LOC | ATIC | N (Y | 0 \$ | re c | · | | o f | conflicte. | w/ L | 3, 9 | (| بعب | <u>, </u> |
|-------------------------------------|---|-----------------------|---------------|--------------|--------------------|----------------------|-----------------|--------------------------|-----------------|------------|--------------|-------------|-------------|----------------|-------------------------------------|------------|------|----|-----|---|
| STATION#3 | | | RM | | | | STREAM CLASS | | | | | | | | | | | | | |
| LAT | _ [| ON | 3 | | | 1 | RIV. | ER B. | ASIN | | | | | | | | | | | |
| STORET# | | | | | | | AGENCY | | | | | | | | | | | | | |
| INVESTIGATORS | A | M 4 | | W 6 | ι, | FIB | | | | | | | Ti | LOT | NUMBER | | | | | |
| FORM COMPLETED | | \neg | | | | | DAT TIM | Έ <u>σ</u> Ε <u>Ι</u> | 4/29/0° 0:38 | (A | D | PM | | REA | SON FOR SURVEY | • | | | | |
| HABITAT TYPES | I | ndic I Co I Sul | ate t bble | he p | erce _% Macı | itage of e Snag | ach | habit | tat type | pre Veg | sen getar | t ted | Bar ther | iks_/ | Sand + concreation,)]S | 15 % _% | | | | |
| SAMPLE | | | | | | | rkick-net Other | | | | | | | | | | | | | |
| COLLECTION | 1 | | | | | oles colle | cted | ? | □∕wad | ing | | | fro | m ba | nk □ from l | nat | | | | |
| · | How were the samples of Indicate the number of Cobble | | | | | | /kic | ks tal | ken in e | ach Veg | hal | bita ted | t ty Ban | pe. | | 7 0 | ٠ | | | |
| GENERAL COMMENTS | | | | | | • | | | | • | | | | | | | • | | | |
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| Periphyton Filamentous Algae | IST abu | ind | G O |)F A :: (| $\frac{QU}{Q} = A$ | bsent/N | ot (|)bsei | rved, 1 | Si | lim | es | | = Co | | dant, | 1 1 | 2 | | 4 |
| Macrophytes | | | | | <u>(0</u> | 1 2 | 3 | 4 | | F | sh | | | | | 0 | 1 | _2 | 3 | 4 |
| FIELD OBSERVA Indicate estimated | abı | ınd | ance |); | 0 = org | Absent/I anisms), | Not 3= | Obse Abu | ndant (| >1(| 0 01 | | | | ganisms), 2 = Co 4 = Dominant (2 | | | | s) | |
| Porifera | | | | | | Anisop | | | | 1 | | | | 4 | | 0 | 1 | | 3 | 4 |
| Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygopt | | | 0 | 1 | | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes Turbellaria | 0 | 1 | 2 | 3 | 4 4 | Hemip | | | 0 | 1 | | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hirudinea | 0 | 1 | 2 | 3 | 4 | Coleop Lepido | | | 0 | 1 | | 2 | 3 | 4 4 | Other | 0 | 1 | 2 | 3 | 4 |
| Oligochaeta | 0 | 1 | 2 | 3 | 4 | Sialida | - | a | 0 | I 1 | | 2 2 | 3 | 4 | | | | • | | |
| Isopoda | 0 | 1 | 2 | 3 | 4 | Coryda | | ۵ | 0 | 1 | | 2 | 3 | 4 | , , , | | | | | |
| Amphipoda | 0 | 1 | 2 | 3 | 4 | Tipulid | | | 0 | 1 | | 2 | 3 | 4 | | | | | | • |
| Decapoda | 0 | 1 | 2 | 3 | 4 | Empidi | | | 0 | 1 | | 2 | 3 | 4 | | | | | | |
| Gastropoda | 0 | 1 | 2 | 3 | 4 | Simulii | | | 0 | 1 | | 2 | 3 | 4 | | | | | | |
| Bivalvia | 0 | 1 | 2 | 3 | 4 | Tabinio | | | 0 | 1 | | 2 | 3 | 4 | | | | | | |
| , | _ | _ | | | | Culcida | | | 0 | - | | 2 | 3 | 4 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | | | * * * | | • • | | | |
|-----------------------------|-------------|----------------------------|--|---|-------------------------------------|------------------------|---|--------------------|
| • | | STREAM NAME | rr Creek | . LOCA | TIONStation 3 | s upst | rean of | CONFINENCE W |
| | | STATION#3 | RIVERMILE | STREA | M CLASS | | - ' | |
| | | LAT 38° 8985W | ONG 87°42. | 935W RIVER | BASIN | | | |
| | | STORET# | | AGEN | CY | | | |
| | | INVESTIGATORS A | | EJB | | | | |
| | | FORM COMPLETED B | Y | DATE TIME | 9:30 AM PM | REASON FOR | RSURVEY | |
| | | WEATHER CONDITIONS | Now | | Past 24 H | las there been a | n heavy rain in t | he last 7 days? |
| | | | 20% 2 | storm (heavy ra rain (steady rai showers (intermit %cloud cove | sin) | ir Temperatur Other | | |
| | | | | clear/sunny | Ν | | | |
| | Dept 0.4 | SITE LOCATION/MAP | Draw a map o | f the site and inc | velocity (1/500 | | photograph) Depth It | Velocity +1/sec |
| 0.5' | | 1,21 | 0.5 | 0.2 | 0.59 | 0.5 | 0,3 | 0.61 |
| | 0,4 | 0.93 | 1.0 | 0.2 | 0.71 | H | 0,5 | 010 |
| 1.5 | 5,4 | 1.06 | 1.5 | 0.2 | 0.76 | 1.0 | The state of the second of the state of the | 0,69 |
| 2.0 0 | 0,4 | 1.17 | 2.0 | 0.2 | 0.68 | 1.5 | 0.5 | 0.75 |
| |).4 | 1.19 | a.5 | 0.2 | 0.7.0 | 2.0 | 0.5 | 0.87 |
| | ,4 | 1.11 | 3.0 | 0.3 | 0,92 | 2.5 | 0.6 | 1.08 |
| 3.0 | | | _ 3.5 | 0.3 | (-1) | 3.0 | 0.6 | 1.13 |
| 3,5 0 | .4 | 1.32 | 4.0 | 0,3 | 1.21 | 1 | | |
| 4.0 0 | . 4 | 1,32 | 4.5 | 0.4 | ,1.29 | 3.5 | 0.6 | 1,30 |
| | 1.4 | 1.47 | 5.0 | 0.4 | 1.12 | 4.0 | 0.6 | 1.35 |
| 5.0 , 0 | 5,4 | 1.27 | 5,5 | 0,5 | 1.32 | 4.5 | 0.5 | 1,32 |
| and the same of the same of | .4 | 1.06 | 6.0 | 0.6 | 1.19 | 5.0 | 0.4 | 1.47 |
| | ,3 | 1.18 | 6.5 | 0,6 | 1.08 | 5.5 | 0,4 | 1.30 |
| | ,3 | 1:15 | 7.0 | 0.6 | 1.03 | 4.0 | 0.5 | 0.81 |
| | - | | 7.5 | 0.5 | 0,91 | 6.5 | 0.5 | 0.54 |
| 7.0 0. | | 1125 | 8.0 | 0,6 | 1,02 | 7.0 | | 0.36 |
| 7.5. | 3,2 | 0.60 | 8,5 | 0.6 | 0.81 | | RIGHT R | |
| 810 | 2.3 | 0,52 | 9.0 | 0,4 | 0,52 | 71 "3 | KIOHIK | Alon |
| 8.5 NO R | 06 | STREAM | 9.5 RIGHT | | | | | |
| 8'10" RT B | | STREAM CHARACTERIZATION | Stream Subsystem Perennial | em Intermittent | U Tidal □ (| ream Type Coldwater | | |
| | | | Stream Origin Glacial Non-glacial m Swamp and bo | ontane Mi | ring-fed xture of origins her | tchment Area_ | km² | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

Station 3
Barr Creek
Upotream of Confluence
with Big Creek

4/29/04

| | 76 B. | |
|--|--|--|
| WATERSHED FEATURES | Predominant Surrounding Landuse Forest Commercial Eield/Pasture Industrial Agricultural Other Residential | Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy |
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and record the domin O Trees dominant species present Reed Cana | ant species present Grasses Herbaceous |
| INSTREAM FEATURES | Estimated Reach Length m Estimated Stream Width m Sampling Reach Area m² Area in km² (m²x1000) km² Estimated Stream Depth m Surface Velocity m/sec (at thalweg) | Canopy Cover Partly open Partly shaded Shaded High Water Markm Proportion of Reach Represented by Stream Morphology Types Riffle |
| LARGE WOODY DEBRIS | LWDm² Density of LWDm²/km² (LWD/ reac | h area) |
| AQUATIC VEGETATION | Indicate the dominant type and record the domin Rooted emergent Rooted submergent Floating Algae Attached Algae | Rooted floating Tree floating |
| · | Portion of the reach with aquatic vegetation 10 | |
| WATER QUALITY 151 = 14.6°C D.O. = 11.55mgk | Temperature 14.6 °C 58.2°F Specific Conductance 5/8 Dissolved Oxygen 101853 pH 8.09 Turbidity 5.27 WQ Instrument Used Institute ORP = 107 | Water Odors Normal/None Sewage Chemical Fishy Other Water Surface Oils Slick Sheen Globs Flecks None Other Turbidity (if not measured) Clear Slightly turbid Turbid Opaque Stained Other |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage Petroleum Chemical Anaerobic None | Deposits ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other |
| | Oils Absent Slight Moderate Profuse | Looking at stones which are not deeply embedded, are the undersides black in color? Yes No |

| INO | RGANIC SUBSTRATE (should add up to 1 | | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | | | | | | |
|-------------------|--------------------------------------|------------------------------------|--|--|-----------------------------------|--|--|--|--|--|
| Substrate Type | Diameter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | | | | |
| Bedrock | | | Detritus | sticks, wood, coarse plant materials (CPOM) | 10 | | | | | |
| Boulder | > 256 mm (10") | | | materials (CFON) | 10 | | | | | |
| Cobble | 64-256 mm (2.5"-10") | | Muck-Mud | black, very fine organic (FPOM) | | | | | | |
| Gravel | 2-64 mm (0.1"-2.5") | 10 | <u>] </u> | (PFOM) | | | | | | |
| Sand | 0.06-2mm (gritty) | 20 | Mari | grey, shell fragments | | | | | | |
| Silt | 0.004-0.06 mm | 30 | | | | | | | | |
| Clay | < 0.004 mm (slick) | 40 | | | | | | | | |

| | A-6 | Appendix A-1: Habitat Assessment and P | hysicochemical Characterization | Field Data Sheets - Form . |
|-------------|-------|--|---|----------------------------|
| sluegill | | Cocket From | | |
| Vivuon &. | | HACH Woter Quality Test Strips | Phosphorto = Oppm Mithite = 0.15 ppm | PO4- |
| lephant Ear | Musse | Softstall Thrtes | Nitrate = 5 ppm | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME BOLT Creek | LOCATION Station 3 | upstream of | Confl w/ | Bia Creek |
|-------------------------------|----------------------------------|------------------|--|-----------|
| STATION# RIVERMILE | STREAM CLASS | | | |
| LATLONG | RIVER BASIN | | | |
| STORET# | AGENCY | | ······································ | |
| INVESTIGATORS Amy, Wally, EDB | | | | |
| FORM COMPLETED BY | DATE 4/29/04 TIME 10:30 MM PM | REASON FOR SURVE | Y | |

| 7 | Habitat Parameter | | Condition | Category | |
|--|---|---|---|--|--|
| | T at attletel | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| reac | SCORE 2 | | 15502: 313142-411 | | |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ated | SCORE 7 | 91793167533556 | DISCOLUTE PARTIES | | |
| to be evalu | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ters | SCORE) | H.C. Martin State of the Co. | | | |
| Param | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | score Z | 15 (\$10° \$5.5 \$5.66)(E | | | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| | SCORE 12 | 20 20 18 17 16 | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat | | Condition | Category | |
|---|---|--|--|---|---|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| | score ¬ | 20 319 3,48 , 17,5346 | als, 514° (12.012.011.) | | |
| sampling reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| Sam | SCORE) | 20 gd9 . [8./ [74.46 | 16-15-14-50 Follow | | |
| Parameters to be evaluated broader than | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| e evalus | SCORE (LB) SCORE (RB) | JeffBanc e old es c RightBank (1810-191) | 1873 LLS | Acceptance of | Tagger Art Spiller |
| Parameters to b | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE (LB) | 040 S2m2 - 320 - 530 | | | |
| | SCORE Z (RB) | | De la companya di santa di sa | | |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE 1 (LB) | ice parts correspond | 128 (128) (138) | | |
| | SCORE (RB) | akigini kank | | | |

Total Score __46_

A-10

a 285 feet from Confluence of Barr + Big to Dounstream End of Station 3

| River Code:RM:Stream: | Barr Creek | |
|--|--|--|
| Date: 4/29/04 Location: Barr Creek | | R'a Com |
| Scorers Full Name: Ed RelmonteAffiliation: | | in Compet |
| 1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; | | g Creek |
| | LE SUBSTRATE QUALITY | |
| | Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE) | E) |
| 10-BOULDER [9] DISAND [6] | E - SILT HEAVY [-2] | , |
| G G G G G G G G G G G G G G G G G G G | -TILLS [1] SILT MODERATE [-1] | Substrate |
| HARDPAN [4] 30 50 DEDETRITUS[3] | - WETLANDS[0] | |
| DIMUCK [2] DIARTIFICIALIO | HARDPAN [0]SILT FREE [1] | 8 |
| EI-SILT [2] 30 30 NOTE: Ignore Studge Originating From Point Sources | -SANDSTONE [0] EMBEDDED -EXTENSIVE [-2] | ريك |
| Prom Point Sources | - EI-RIP/RAP [0] NESS: EI-MODERATE [-1] | Max 20 |
| NUMBER OF SUBSTRATE TYPES: 4 or More [2] | - LACUSTRINE [0] - NORMAL [0] | |
| (High Quality Only, Score 5 or >) | ☐ -SHALE [-1] ☐ -NONE [1] | |
| COMMENTS | | |
| 2] INSTREAM COVER (Give each cover type a score of 0 to | 3; see back for instructions) AMOUNT: (Check ONLY One | |
| (Structure) TYPE: Score All That Occur | check 2 and AVERAGE) | Cover |
| UNDERCUT BANKS [1] XPOOLS> 70 cm [2] | OXBOWS, BACKWATERS [1] | |
| OVERWANGING VEGETATION [1]ROOTWARS [1] | AQUATIC MACROPHYTES [1] D - MODERATE 25-75% [7] | 6 |
| SHALLOWS (IN SLOW WATER) [1]BOULDERS [1] | LOGS OR WOODY DEBRIS [1] SPARSE 5-25% [3] | May 20 |
| ROUTWATS [1] COMMENTS: | | Max 20 |
| | legory OR check 2 and AVERAGE |] |
| SINUOSITY DEVELOPMENT CHANNELIZATION | STABILITY MODIFICATIONS/OTHER | Channel |
| D - HIGH [4] D - EXCELLENT [7] D - NONE [6] | D-HIGH [3] D-SNAGGING D-IMPOUND. | |
| □ - MODERATE [3] □ - GOOD [5] □ - RECOVERED [4] | | 5 |
| LOW [2] D FAIR [3] D - RECOVERING [3] | | ريي |
| I NONE [1] THE RECENT OR NO | 3 | Max 20 |
| RECOVERY [1] | ☐ - DREDGING ☐ - BANK SHAPING ☐ - ONE SIDE CHANNEL MODIFICATIONS | 3 |
| COMMENTS: | D ONE SIDE CHANNEL MODIFICATIONS | * |
| 4]. RIPARIAN ZONE AND BANK EROSION check ONE box per | | |
| The state of the contract of t | r bank or check 2 and AVERAGE per bank) 👂 Divor Dight Leaking | Daymatra am 6 |
| RIPARIAN WIDTH FLOOD PLAIN OU | A1 1987 18 18 18 18 18 18 18 18 18 18 18 18 18 | Downstream f |
| RIPARIAN WIDTH FLOOD PLAIN QU | ALITY (PAST 100 Meter RIPARIAN) BANK EROSION | Downstream f Riparian |
| L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L R (Most Predominant Per Bank D D FOREST, SWAMP [3] | ALITY (PAST 100 Meter RIPARIAN) k) L R L R (Per Bank) L R (Per Bank) L R (Per Bank) | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L R (Most Predominant Per Bank D D FOREST, SWAMP [3] C D SHRUB OR OLD FIELD [2] | ALITY (PAST 100 Meter RIPARIAN) k) L R L R (Per Bank) CONSERVATION TILLAGE [1] U-URBAN OR INDUSTRIAL [0] | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L R (Most Predominant Per Bank D POREST, SWAMP [3] D SHRUB OR OLD FIELD [2] RARROW 5: 10 m [2] D PRESIDENTIAL, PARK, NEW FIELD | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L R (Most Predominant Per Bank D D FOREST, SWAMP [3] C D SHRUB OR OLD FIELD [2] | ALITY (PAST 100 Meter RIPARIAN) k) L R L R (Per Bank) CONSERVATION TILLAGE [1] U-URBAN OR INDUSTRIAL [0] | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank CD - WIDE > 50m [4] CD - FOREST, SWAWP [3] CD - MODERATE 19-50m [3] CD - SHRUB OR OLD FIELD [2] CD - PERCED PASTURE [1] CD - NONE [0] | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] | Riparian |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank DD - WIDE > 50m [4] DD - FOREST, SWAMP [3] DD - RODERATE 10-50m [3] DD - SHRUB OR OLD FIELD [2] DD - FERCED PASTURE [1] DD - FERCED PASTURE [1] DD - HONE [0] COMMENTS: | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] | Riparian 3] 2./ |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank CD - WIDE > 50m [4] CD - FOREST, SWAWP [3] CD - MODERATE 19-50m [3] CD - SHRUB OR OLD FIELD [2] CD - PERCED PASTURE [1] CD - NONE [0] | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CULTURBAN OR INDUSTRIAL [0] | Riparian [3] Z./ [1]Max 10 Pool/ |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] U-CONSERVATION TILLAGE [1] U-NONE/LITTLE [1] COPEN PASTURE, ROWCROP [0] CURRENT VELOCITY POOLS & RIFFLES! | Riparian 3] 2./ |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] U-CONSERVATION TILLAGE [1] U-CONSERVATION TILLAGE [1] U-CONSERVATION TILLAGE [1] U-NONE/LITTLE [1] U-MODERATE [2] U-MENING/CONSTRUCTION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) | Riparian [3] Z./ [1]Max 10 Pool/ |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CURRENTIAL [1] | Riparian [3] Z./ [1]Max 10 Pool/ |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CURRENTIAL [-1] CONSERVATION TILLAGE [1] C | Riparian [3] Z./ [1]Max 10 Pool/ |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CHAST[1] CHAS | Riparian [3] Z./ [1]Max 10 Pool/ Current |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CURRENTIAL [-1] CONSERVATION TILLAGE [1] C | Riparian [3] Z./ [1]Max 10 Pool/ Current |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank DD - WIDE > 50m [4] D - FOREST, SWAMP [3] D - FOR | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CHAST[1] CHAS | Riparian [3] Z./ [1]Max 10 Pool/ Current [9] Max 12 |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bant DD - WIDE > 50m [4] DD - FOREST, SWAMP [3] DD - MODERATE 10-50m [3] DD - SHRUB OR OLD FIELD [2] DD - FERCED PASTURE [1] DD - FERCED PASTURE [1] DD - NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) DD - POOL WIDTH > RIFFLE WIDTH [2] DD - POOL WIDTH > RIFFLE WIDTH [1] DD - O.4-0.7m [2] DD - POOL WIDTH < RIFFLE WIDTH [1] DD - O.2-0.4m [1] DD - COMMENTS: | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] U-URBAN OR INDUSTRIAL [0] COPEN PASTURE, ROWCROP [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) COPEN PAST[1] COPEN PAST[1] COPEN PAST[1] COPEN PAST[1] COPEN PASTURE, ROWCROP [0] COPEN PASTURE, ROWCROP PASTURE, | Riparian [3] Z./ [1]Max 10 Pool/ Current |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bant DD - WIDE > 50m [4] DD - FOREST, SWAMP [3] DD - MODERATE 10-50m [3] DD - SHRUB OR OLD FIELD [2] DD - FERCED PASTURE [1] DD - FERCED PASTURE [1] DD - NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) DD - POOL WIDTH > RIFFLE WIDTH [2] DD - O.7-1m [4] DD - POOL WIDTH > RIFFLE WIDTH [1] DD - O.2- 0.4m [1] DD - O.2- 0.4m [1] DD - COMMENTS: CHECK ONE COMMENTS: | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] U-URBAN OR INDUSTRIAL [0] OPEN PASTURE, ROWCROP [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] | Riparian 3] Z./ [1]Max 10 Pool/ Current 9 Max 12 Riffle/Run |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank DD - WIDE > 50m [4] DD - FOREST, SWAMP [3] DD - MODERATE 10-50m [3] DD - MODERATE 10-50m [3] DD - MODERATE 10-50m [3] DD - MORE 00 OLD FIELD [2] DD - MORE 00 DD - FENCED PASTURE [1] DD - NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) DD - VIDTH > RIFFLE WIDTH [2] DD - 0.7-1m [4] DD - 0.4-0.7m [2] DD - POOL WIDTH > RIFFLE WIDTH [1] DD - 0.2-0.4m [4] DD - OOL WIDTH > RIFFLE W. [0] DD - VIDTH RIFFLE W. [0] DD | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] U-URBAN OR INDUSTRIAL [0] OF OPEN PASTURE, ROWCROP [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] CURRENT VELOCITY POOLS & RIFFLES!] (Check All That Apply) CONSERVATION [0] | Riparian [3] Z./ [1]Max 10 Pool/ Current [9] Max 12 |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank L | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] COPEN PASTURE, ROWCROP [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CHECK 2 AND AVERAGE FILE/RUN SUBSTRATE BLE (e.g., Cobble, Boulder) [2] BANK EROSION R (Per Bank) R (Per Bank) C (Per Bank) C HEAVY/SEVERE CHECK 2 AND AVERAGE RIFFLE/RUN EMBEDDEDNESS R (Per Bank) R (P | Riparian 3] Z./ [1]Max 10 Pool/ Current 9 Max 12 Riffle/Run |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank Di - WIDE > 50m [4] Di - FOREST, SWAMP [3] Di - MODERATE 10-50m [3] Di - SHRUB OR OLD FIELD [2] Di - RESIDENTIAL, PARK, NEW FIELD VERY NARROW <5 m [1] Di - FENCED PASTURE [1] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) Di - > 1m [6] MORPHOLOGY (Check 1 or 2 & AVERAGE) CHECK ONE (1) Di - 0.4-0.7m [2] Di - 0.4-0.7m [2] Di - 0.2-0.4m [1] Di - < 0.2m [POOL=0] COMMENTS: CHECK ONE (2) RIFFLE DEPTH RIF CHECK ONE (2) RUN DEPTH RIF CHECK ONE (3) RUN DEPTH RIF CHECK ONE (3) RUN DEPTH RIF CHECK ONE (3) RUN DEPTH RIF CHECK ONE (4) RUN DEPTH RIF CHECK ONE (4) RUN DEPTH RIF CHECK ONE (4) RUN DEPTH RIF CHECK ONE (5) RUN DEPTH RIF CHECK ONE (6) RU | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CHECK 2 AND AVERAGE FLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS BLE (e.g.,Cobble, Boulder) [2] BANK EROSION R (Per Bank) C (Per Bank) | Riparian 3] Z./ [1]Max 10 Pool/ Current Max 12 Riffle/Run Wax 8 |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank Did- WIDE > 50m [4] Disperset, Swamp [3] Disperset, Swamp [4] Disperset, Swamp [4] Disperset, Swamp [4] Disperset, Swamp [4] Disperset, S | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CHECK ALL THAT APPLY CHECK ALL THAT APPLY CHECK ALL THAT APPLY CHECK ALL THAT APPLY CHECK 2 AND AVERAGE FLE/RUN SUBSTRATE BLE (e.g.,Cobble, Boulder) [2] CTABLE (Fine Gravel, Sand) [0] BANK EROSION R (Per Bank) C (Per Bank) CHECK 2 MODERATE [1] CHECK 2 MODERATE [1] CHECK 2 AND AVERAGE RIFFLE/RUN EMBEDDEDNESS CHECK 2 IN COMPANY IN COMP | Riparian 3] Z./ [1]Max 10 Pool/ Current 9 Max 12 Riffle/Run 9 234. |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) Di-WIDE > 50m [4] Di-FOREST, SWAMP [3] DI-MODERATE 10-50m [3] DI-MODERATE 10-50m [3] DI-SHRUB OR OLD FIELD [2] DI-MORE [0] COMMENTS: DI-MONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) DI-MONE [0] COMMENTS: DI-MONE [0] COMMENTS: 6.]POOL WIDTH > RIFFLE WIDTH [1] DI-O.4-0.7m [2] DI-POOL WIDTH < RIFFLE WIDTH [1] DI-COLA-0.7m [2] DI-POOL WIDTH < RIFFLE WIDTH [1] DI-COLA-0.7m [2] DI-MONE [1] DI-MONE [2] DI-STAIL CHECK ONE COMMENTS: DI-MONE [1] DI-M | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CHECK 2 AND AVERAGE FLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS BLE (e.g.,Cobble, Boulder) [2] BANK EROSION R (Per Bank) C (Per Bank) | Riparian 3] Z./ [1]Max 10 Pool/ Current Max 12 Riffle/Run Wax 8 |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CHEAVY/SEVERE (CHECK ALL THE APPLY APPLIES AND APPLIES A | Riparian 3] Z./ [1]Max 10 Pool/ Current Max 12 Riffle/Run Max 8 Gradient |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank Did- WIDE > 50m [4] Disperset, Swamp [3] Disperset, Swamp [4] Disperset, Swamp [4] Disperset, Swamp [4] Disperset, Swamp [4] Disperset, S | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY POOLS & RIFFLES! (Check All That Apply) CHEAVY/SEVERE (CHECK ALL THE APPLY APPLIES AND APPLIES A | Riparian 3] Z./ [1]Max 10 Pool/ Current Max 12 Riffle/Run Wax 8 |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | ALITY (PAST 100 Meter RIPARIAN) k) L R CONSERVATION TILLAGE [1] CURBAN OR INDUSTRIAL [0] CURRENT VELOCITY [POOLS & RIFFLES!] (Check All That Apply) CHEAVY/SEVERE (Check All That Apply) FAST[1] FAST[1] FAST[1] FAST[1] FAST[1] FOR CHECK 2 AND AVERAGE FLE/RUN SUBSTRATE BLE (e.g.,Cobble, Boulder) [2] CTABLE (Fine Gravel,Sand) [0] BANK EROSION R (Per Bank) C HECK 2 MODERATE [1] CHEAVY/SEVERE CHECK 2 RIFFLES!] BANK EROSION R (Per Bank) C HEAVY/SEVERE CHEAVY/SEVERE CHEAVY/SEVE | Riparian 3] Z./ [1]Max 10 Pool/ Current Max 12 Riffle/Run Max 8 Gradient |

Macrobenthos Qualitative Sample List

| l# | | Macrobantii | os Quailitative Sample | List | | | | |
|---------|---------------------------------------|---|--------------------------|--|--------------|------------------|-------|------------------------|
| | ORDER | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | FBI | |
| | Nematomorpha | · · · · · · · · · · · · · · · · · · · | | | 223111 | | | Parasite |
| | Hydracarina- Trombidiformes | | | | | | 0.000 | Predators/Parasite |
| | Tubellaria | Planaria | | | | 4 | | Omnivore |
| | Porifera | Spongillidae | | | | | 0.000 | |
| 31 | Pelecypoda | Corbiculidae | | fluminea | 3 | 3.2 | 0.097 | |
| | | Dreissenidae Unionidae | Dreissena Villosa | polymorpha iris | | | | Filters |
| 18 | | Sphaeriidae | VIIIOSE | | | 8 | | Filters |
| | Gastropoda | Ancylidae | | | | 6 | 0.000 | Scrapers |
| 20 | | Lymnaeidae | | | | 6.9 | 0.000 | Scrapers |
| | | Lymnaeidae | Fossaria | | _ | 6 | 0.000 | Scrapers |
| 19 | | Physidae Physidae | Physelia | | 2 | 8 | | Scrapers Scrapers |
| | | Planorbidae | гпуани | | | 7 | | Scrapers |
| | | Planorbidae | Planorbula | | | 7 | 0.000 | Scrapers |
| | | Pleuroceridae | | | | | 0.000 | Scrapers |
| _ | A | Bithyniidae | Bithynia | tentaculata | | | 0.000 | Scrapers |
| 1 25 | Annelida | Hirudinea Oligochaeta | | | 1 | 10 | | Gathers Gathers |
| | Decapoda | Orgochaeta | | | 1 | 8 | | Predators |
| 17 | Amphipoda | | | | 9 | 4 | | Shredders |
| 24 | isopoda | Asellidae | | | 1 | 8 | | Shredders |
| | Ostracoda | 6 | | | | 8 | | Scavengers |
| 13 | Ephemeroptera | Caenidae Caenidae | Caenis | | 1 | 3.1 | | Gathers Gathers |
| ,,, | | Ephemeridae | Hexagenia | | | 3.6 | | Gathers |
| 15 | | Baetidae | Baetis | | | 3.1 | | Gathers |
| | | Baetidae | Baetis | brunneicolor | | 4 | | Gathers |
| | | Baetidae | Baetis Callibratio | intercalaris | | 2.7 | | Gathers |
| 14 | | Baetidae Heptageniidae | Callibaetis Stenacron | | | 5.6 3.1 | | Gathers Scrapers |
| 14 | | Heptageniidae | Stenacron | gildersleevei | | 3.1 | 0.000 | Scrapers |
| | <u> </u> | Heptageniidae | Stenonema | | | 4 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | exiguum | | 1.9 | | Scrapers |
| | | Isonychiidae | Isonychia | | | 2 | | Filters |
| | | Leptohyphidae Siphlonuridae | Tricorythodes | | | 2.7 | | Gathers Gathers |
| | | Ephemerellidae | Timpanoga | | | 1 | | Gathers |
| | | Leptophlebiidae | | | | 2 | | Gathers |
| | Coleoptera | Dytiscidae | | | | 5 | | Predators |
| 37 | | Gyrinidae | | | | 5 | 0.000 | Predators |
| 27,33 | - | Gyrinidae Haliplidae | Dineutus | | 1 | 3.7 7 | | Predators Predators |
| 27,00 | | Dryopidae | | | | 5 | | Predators |
| 28,32 | | Elmidae | | | | 4 | 0.000 | Gathers |
| | | Psephenidae | Psephenus | | | 4 | 0.000 | Scrapers |
| _ | | Hydrophiloidae | | | | | | Gathers |
| 7 | Megaloptera | Hydrophiloidae Sialidae | Tropistemus | | | 4 | | Gathers Predators |
| | Megaoptera | Corydalidae | Corydalus | | | 4 | | Predators |
| | Trichoptera | Brachycentridae | Brachycentrus | | | i | 0.000 | Filters |
| | | Helicopsychidae | Helicopsyche | | | 3 | | Scrapers |
| | | Helicopsychidae | Helicopsyche | borealis | | <u> </u> | 0.000 | Scrapers |
| 16 | | Hydropsychidae Hydropsychidae | Hydropsyche | | | 4 4 | 0.000 | Filters Filters |
| | | Hydropsychidae | Hydropsyche | betteni | | 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | scalaris | | 4 | 0.000 | Filters |
| | | Hydropsychidae | Symphitopsyche | | | 4 | 0.000 | Filters |
| | | Hydroptilidae | | | | 4 | | Gathers |
| | | Hydroptilidae Leptoceridae | Hydroptila | | | 3.2 4 | | Gathers Shredders |
| | | Leptoceridae | Nectopsyche | | | 4 | | Shredders |
| | | Molannidae | | | | 6 | 0.000 | Gathers |
| | | Philopotamidae | | | | 3 | 0.000 | Filters |
| | | Phryganeidae | Hagenella | | | 4 | | Shredders |
| | | Polycentropodidae Psychomyiidae | Cyrnellus | <u> </u> | | 6 2 | | Filters |
| Q.R | Hemiptera | Belostomatidae | Lуpe | | | | | Gathers Predators |
| | | Belostomatidae | Belostoma | | | | 0.000 | Predators |
| 34 | | Corixidae | | | | 10 | 0.000 | Predators |
| 3 | • | Gerridae | + | | | 5 | | Predators |
| | | Gerridae Notonectidae | Trepobates Notonecta | | | 5 | 0.000 | Predators Predators |
| | | Nepidae | TOTOTIONE | | | | | Predators Predators |
| | <u> </u> | Nepidae | Ranatra | İ | | | 0.000 | Predators |
| | Piecoptera | Perlidae | Perlesta | | | 1 | 0.000 | Predators |
| | | Perlidae | Neoperia | | | 1 | | Predators |
| | Odonata-Anisontera | Chloroperlidae Aeshnidae | | - | | 1 3 | | Predators Predators |
| | Odonata-Anisoptera | Aeshnidae | Boyeria | | | 3 | | Predators Predators |
| | | Gomphidae | | | | 1 | 0.000 | Predators |
| | <u> </u> | Cordulegastridae | | | | 3 | 0.000 | Predators |
| 22 | | Corduliidae | | | 9 | 5 | 0.455 | Predators |
| | Odonata Zugontara | Libellulidae | | | | 9 | 0.000 | Predators Predators |
| 4 | Odonata-Zygoptera | Calopterygidae Calopterygidae | Calopteryx | ! | | 5 3.7 | | Predators Predators |
| 6 | | Coenagrionidae | | | | 0.1 | | Predators |
| 5 | | Coenagrionidae | Argia | | 1 | 5.1 | 0.052 | Predators |
| 30 | | Coenagrionidae | Engallagma | | 4 | . 9 | 0.364 | Predators |
| | Diptera | Lestidae | | | | 9 5.7 | | Predators |
| 11 | Dynora | Geratopogonidae Blood-red Chironomidae | | | 18 | 8.1 | | Gathers Gathers |
| 12 | | Other Chironomidae | | | 36 | 6 | | Gathers |
| 35 | | Culicidae | | | | 8 | 0.000 | Shredders |
| 10 | | Simuliidae | | l | 12 | 6 | 0.727 | Filters |
| 2 | | Tipulidae Stratiomyidae | | | | 3 8 | | Predators Gathers |
| 25 | • | Tapanos- | | | | | | Predato: |
| | · · · · · · · · · · · · · · · · · · · | · | | | | | | |

| TAXA RICHNES. | 1.5 |
|---------------------------------|-------|
| FBi | 6.169 |
| Scraper/Filter | 0.200 |
| EPT/Chironomidae | 0.037 |
| % Contribution of Dominant Taxa | 0.360 |
| EPT Index | 2.000 |
| Community Similarity Indices | 0.667 |
| , .,, | 0.000 |

Comm. Loss = 0.667 Jaccard Coef. = 0.360

total shredders

100

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

STREAM NAME Big LOCATION Water Creek STATION # RIVERMILE STREAM CLASS LAT LONG RIVER BASIN STORET# AGENCY COLLECTED BY ESB, WGC LOT# DATE 4/29/04 TAXONOMIST ESB. WGL SUBSAMPLE TARGET □ 100 □ 200 □ 300 □ Other DATE

| Organisms | | No. | LS | TI | TCR | 0 | rganisms | No. | LS | TI | TCR |
|---------------|--------------------|------|----|------|--------------|------------------|------------------------------|-----|----|------|-----|
| Oligochaeta | איז איז איז יכן | N | A | wer | , | Megaloptera | | | | | |
| Hirudinea | | | - | | | Coleoptera | | - | | | |
| | | | | | | Dy tocidee | 11 0 | 2 | A. | W 8L | , |
| Isopoda | m (| DX | A | WGL | , | Hulipide | H4 H4 (8) | ٣ | A | USL | / |
| Amphipoda | 11 11 11 | 2 7 | Α | wel | 1 | Diptera | Smulike - 111 (2) | 3 | エ | WUL | 1 |
| | | | | | | Bown chis | IM IM IM IM IM IM | 21 | I | woL | 1 |
| Decapoda | | | | | | Blods Res | P ILM IM | 24 | I | WGL | , |
| Ephemeroptera | Gnid - 111 6 | 2 1 | I | LUGE | • 4 7 | 174.5 | | | | | |
| | | 2 | I | U OL | 1 | Gastropoda | LHS-11-Physial | 2 | A | WOL | 1 |
| | | | | | | | Rambom - 1 10 Lolenorbiae | 1 | A | wil | |
| | | | | | | Pelecypoda | | | | | |
| Plecoptera | | | | | | Eurason | P III M M | 74 | A | WCL | j |
| | | | | | | Other Cornegrand | | | I | 464 | 1 |
| | | | | | | calopteryx | THE IN IN IH | 21 | I | WGL | - |
| | | | | | | | (3) | Z | A | wbl | 1 |
| Trichoptera | Hydro py scila - M | (3)8 | I | WEL | 1 | Honce Her | | -1 | A | W6L | 1 |
| • | | | | | | Dragun Fly | 11 0 | 7 | I | W6L | (|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Hemiptera | | | | | | | | | | | |
| | | - | | | | | | | | | |

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stag I = immature; P = pupa; A = adult TI = Taxonomists initials

| Total No. Organisms | JH7 (| 100 |
|---------------------|-------|-----|
| ~ | | |

Total No. Taxa

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME | 2,,' | (| reel | | | LOCATION | S 1 | | . 4 | ı | 1, | 12to Tank | Q. | , | | | |
|-------------------------------------|----------|------|-------------|------------|---------|--|-------------------|-------|------------|-------|-------|---------------------------------------|---------|--------------|----------|------------|-----|
| STATION# 4 | | | RMI | | | STREAM CI | | 4,-10 | <u>^ '</u> | , | | 71,40 | | | | | |
| LAT | | ONO | | | | RIVER BAS | | | | - | | | | - | | | |
| STORET# | <u> </u> | | | | · | AGENCY | | | | | | | | | | | |
| | Λ | | , | 2.6 | , | | | | | Τ, | OT | NUMBER | | | | | |
| INVESTIGATORS FORM COMPLETED | | | U | <i>)</i> | <u></u> | DATE 4/2 | 9/ ₀ U | | | + | | SON FOR SURVEY | | | | - | |
| EJB, | | | _ | | | TIME K'O | | AM | PM | ~ı | | | | | | | |
| | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | _ |
| HABITAT TYPES | Q | rCo1 | bble_ | 10 | _% | age of each habitat Snags% phytes% | | eget/ | | | | <u>0</u> % □ Sand | % | | | | |
| SAMPLE | 6 | ear | used | | D-fi | me 🖫 kick-net | | | ther | | | | | | | | |
| COLLECTION | 1 | | | | | les collected? | | | | | m bar | nk 🚨 from bo | - at | | • | | |
| | ł | | | | | | | | | . 4 4 | | | | | | | |
| | P | Col | bble_ | ./b | | r of jabs/kicks taken Snags <u>/o</u> | | ege! | tated | Ban | iks_! | 2 Sand / | ۵ | | | | |
| | 2 | Sul | mer | ged l | Маст | phytes <u>lo</u> | | | <u> </u> |)ther | (|) | | | | | |
| GENERAL | C | heli | رس ور اس | ر | | | | | | | | | | | | | |
| COMMENTS | / | tu | سه | hea . |) | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | |
| QUALITATIVE L Indicate estimated | | | | | | | | _ D | • | 1 - | - C- | : | | ı _ 1 | . | | _4 |
| inuicate estimateu | auu | ina | ance | . u | , – 4 | Sentinot Observe | u, 1 | - K | ai c, | .4- | - 00 | innion, 3- Abunu | anı, 4 | | ווטע | IIIIA | iil |
| Periphyton | | | | | 6 | 1 2 3 4 | | Slir | nes | | | | (d) | 1 | 2 | 3 | 4 |
| Filamentous Algae | | | | | 0 | 1 🗷 3 4 | | Ma | стоі | nve | rtebr | ates | 0 | 1 | 2 | 3 | 4 |
| Macrophytes | | | | | 0 | $(1)^2 3 4$ | | Fis | h | | | | 0 | 1 | 1 | 3 | 4 |
| | | | | | | | | | - | | | | | (| | | |
| FIELD OBSERVA | | | | | | | | | _ | | | | | | | | |
| Indicate estimated | abu | ınd | ance | : : | | | | | | | | ganisms), 2 = Cor 4 = Dominant (>: | | | | e) | |
| | | | | | UI g | misms), 5 Abana | ant (~ | 10 | org | AIII3 | шэ, | 4 – Dominaut (>. | 30 UL) | Sau | 13111. | • <i>)</i> | |
| Porifera | 0 | 1 | 2 | 3 | 4 | Anisoptera | 0 | 1 | 2 | 3 | 4 | Chironomidae | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygoptera | 0 | 1 | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes | 0 | 1 | 2 | 3 | 4 | Hemiptera | 0 | 1 | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Turbellaria | 0 | 1 | 2 | 3 | 4 | Coleoptera | 0 | 1 | 2 | 3 | 4 | Other | 0 | 1 | 2 | 3 | 4 |
| Hirudinea | 0 | 1 | 2 | 3 | 4 | Lepidoptera | 0 | 1 | 2 | 3 | 4 | • | | | | | |
| Oligochaeta | 0 | 1 | 2 | 3 | 4 | Sialidae | 0 | 1 | 2 | 3 | 4 | • | | | | | |
| Isopoda | 0 | 1 | | 3 | 4 | Corydalidae | 0 | 1 | 2 | 3 | 4 | | | | | | • |
| Amphipoda | 0 | 1 | 2 | 3 | 4 | Tipulidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Decapoda Gastropoda | 0 | 1 | 2 | 3 | 4 4 | Empididae Simuliidae | 0 | 1 | 2 | 3 | 4 | , | | | | | |
| Bivalvia | 0 | 1 | 2 | 3 | 4 | Tabinidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| DIAGIAIG | v | 1 | 4 | J | + | Culcidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| | | | | | | | V_ | | -4 | | | L | | | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET . (FRONT)

| · | STREAM NAME | Creek | LOCA | TION Upstream | am of l | Unter Tank | Rd Station | | | | |
|---|--|---|--|--|------------|--------------|--|--|--|--|--|
| | | UVERMILE | STREA | STREAM CLASS | | | | | | | |
| | LAT 38" 9,70 WL | ONG 87°43 . | 916 MRIVER | BASIN | | 3 | | | | | |
| | STORET # | | AGEN | AGENCY | | | | | | | |
| | INVESTIGATORS A. | y, Wally | ESB | | | | | | | | |
| | FORM COMPLETED BY | | DATE | OH/RA/OH | | N FOR SURVEY | | | | | |
| | Es | <u>B</u> | - 12.412 | 5100 AM (| | · | | | | | |
| | WEATHER CONDITIONS | Now | storm (heavy ra rain (steady ra showers (intermi %cloud cove clear/sunny | in) | Air Temp | | in the last 7 days? | | | | |
| | SITE LOCATION/MAP FTH VELOCITY FT /SEC | Draw a map o | the site and in DE PTH | dicate the areas s V € LOC 1 M | DELD | DEPTH 4 | tt/sec | | | | |
| ,0' | 2 (-0.03) | 1.0 | 0.8 | .32 | 1.0 | 1.0 | 04 | | | | |
| | (-0.04) | 2.0 | 1.2 1.5 | .40 | 3.0 3.0 | 1.8 | 07 | | | | |
| X.U | | 3.0 4.0 | 1.4 | .25 | 4.0 | 2.2 | .01 | | | | |
| 3.0 1.4 | | Hi | | | 5.0 | 2.1 | .06 | | | | |
| 4.0 1.6 | 0.09 | 5.0 6.0 | 1.5 | •59 •62 | 6.0 | 7.3 | .07 | | | | |
| F 5 1.6 | 0,49 | 70 | 1.4 | •63 | 7.0 | 2.4 | -/8 | | | | |
| 5.0 | - Charles and the Control of the Con | 8.0 | 1.4 | .62 | 8.0 | 2.3 | .20 | | | | |
| 6.0 .1.6 | 0.78 | 9.0 | 1.5 | -61 | 9.0 | 2.4 | .28 | | | | |
| 7 1 1 6 | 1.02 | 10.0 | 1.4 | .60 | 11.0 | 2.5 | -47 | | | | |
| The best of the second | 0,91 | 11.0 | 1.2 | .67 | 12.0 | 7.5 | .51 | | | | |
| 3.0 1.6 | to be and the second se | 12.0 | 1.2 | .67 | 13.0 | 2.5 | .5> | | | | |
| 1.0 1.5 | THE VALUE OF THE PROPERTY OF THE PARTY OF TH | 13.0 | 1.2 | .65 | 14.0 | 2.6 | .55 | | | | |
| 0.0 1.5 | 0.76 | 14.0 | 1.3 | .48 | 15.0 | 2.5 | -48 | | | | |
| man and the state of the state | 0.63 | 15.0 | 0.2 | .12 | 16.0 | 2.3 | .56 | | | | |
| F # 50 | 0.58 | 16.5 | RT Ba | 1 | 17.0 | 2.0 | | | | | |
| 12.0 1.3 | And the second section of the s | د.ها | 14, 04 | | 18.0 | 1.3 | .15 | | | | |
| (3.0 1.1 | 0.58 | , | • | | 119.0 | | ./3 | | | | |
| 14,0 0.4 | 0.17 | | | | 20 | ন | Bank | | | | |
| 15= RT BA | WK | | | - | | | And the second s | | | | |
| | STREAM CHARACTERIZATION | Stream Subsys Perennial Stream Origin | ☐ Intermittent | □ Tidal | * | Warmwater | 1 | | | | |
| | | Glacial Non-glacial Swamp and t | nontane ☐ Sr M | oring-fed ixture of origins ther | Catchment | Area | km² | | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSHED FEATURES | Predominant Surrounding Landuse Forest Commercial Field/Pasture Industrial Agricultural Other Residential | Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy |
|--|--|---|
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and record the domin Trees Shrubs | nant species present Grasses |
| INSTREAM FEATURES | Estimated Reach Length | Capopy Cover Partly open Partly shaded Shaded High Water Markm Proportion of Reach Represented by Stream Morphology Types Riffle 10 % Run 40 % Pool 50% Channelized Yes No Dam Present Yes No |
| LARGE WOODY DEBRIS AQUATIC VEGETATION | LWDm² Density of LWDm²/km² (LWD/ read) Indicate the dominant type and record the dominant type and record the dominant type and record submergent | nant engales present |
| | dominant species present | |
| WATER QUALITY | Temperature 21.3 °C 70.3 °F Specific Conductance 580.7 Dissolved Oxygen 74859 pH 8.03 Turbidity 18.2 WQ Instrument Used I | Water Odors Normal/None |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage Petroleum Chemical Anaerobic None Oils | Deposits Sludge Sawdust Paper fiber Sand Chelict shells Other Looking at stones which are not deeply embedded, age the undersides black in color? |
| | Absent Slight Moderate Profuse | Yes No |

| INC | RGANIC SUBSTRATE (should add up to | COMPONENTS 100%) | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | | | | |
|-------------------------|---------------------------------------|------------------------------------|--|------------------------------------|-----------------------------------|--|--|--|
| Substrate Diameter Type | | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | | |
| Bedrock | | | Detritus | sticks, wood, coarse plant | 10 | | | |
| Boulder | > 256 mm (10") | 5 | 1 | materials (CPOM) | 10 | | | |
| Cobble | 64-256 mm (2.5"-10") | 10 | Muck-Mud | black, very fine organic (FPOM) | | | | |
| Gravel | 2-64 mm (0.1"-2.5") | 25 | | (FPOM) | | | | |
| Sand | 0.06-2mm (gritty) | 30 | Marl | grey, shell fragments | | | | |
| Silt | 0.004-0.06 mm | 20 | | | S | | | |
| Clay | < 0.004 mm (slick) | 10 | | | | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME BTQ CTERIC | LOCATION Station 4. Water Tank Rd |
|------------------------------|-----------------------------------|
| STATION # 4 RIVERMILE | STREAM CLASS |
| LATLONG | RIVER BASIN |
| STORET# | AGENCY |
| INVESTIGATORS AMY, WALLY, ES | 8 |
| FORM COMPLETED BY | DATE 04/29/04 REASON FOR SURVEY |

| ; | Habitat | | Condition | Category | |
|--|---|---|---|--|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| react | SCORE 7 | 70. (40.16567), 16 | | | 1. <u>1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1</u> |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ated | SCORE 12 | emica en assertación en el | | | |
| to be evalu | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ters | score 13 | elo sepolosidade | | | |
| Parame | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | SCORE 4 | to the attacker (c | 15/10/1/14/20/14/6 | | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| | score 14 | 28 9 18 17 -16 | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat | | Condition | Category | |
|--|--|--|--|---|---|
| l | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| | SCORE 8 | 20 19 . 18: Ji 16 | 35 54 Se - 12° 41. | 10 75 ⁴ /8) 75.6 | Section Assessment Co. |
| pling reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length I to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| Sam | SCORE | 26 ,19 -78 17 - 16 | 18 14 15 12 114 | Ho S 48 42-66. | 55 PASSALEDA |
| Parameters to be evaluated broader than sampling reach | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| alua | SCORE 7 (LB) | Left Bank 10 10 10 1 | 7 7 5 9 | | Company of the |
| e ev | SCORE (RB) | Rightbank (2000) | 1980 (E. 7 1) 166 P | | |
| Parameters to l | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE 3 (LB) | Left Barit . 5, 10, 9 | 8 30 7 36 | No. 34 . (6) | 2011 12/07/06/2 |
| | SCORE _ (RB) | Right tholess, 10, 34 | | | |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE (LB) SCORE (RB) | Eaff Bank 40 10 W | A 7 4 4 | 4 S 4 48 | |

Total Score 68

A-10

| | | FFA | |
|---|----|-----|--|
| U | Œ. | | |

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 46

| River Code: | RM: | Stream: | Dia CI | rek | | | | <u> </u> |
|---|--|--|--------------|--------------------------------|---------------------------------------|----------------|-------------------------------------|-------------------------|
| Date: 4/29/04 | Location:_ | Station 4. | Tevat | er Tank | Rd | | | |
| Scorers Full Name: Ed | Belmont | Affiliation. | <u> </u> | 3 | | | | |
| 1] SUBSTRATE (Check ONL | Y Two Substr | ateTYPE BOXES | S; Estima | te % present | t | | | |
| TYPE POOL RIF | | | | STRATE ORK | | | RATE QUALITY | |
| ☐ ☐-BLDR /SLBS[10] | _ DI-GRAV | - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 | | NE (OR 2 & A | | Check ONE | E (OR 2 & AVERAGE |) |
| □□-BOULDER [9] | _ DD-SAND | • • | | MESTONE [1] | SILT: | | FHEAVY [-2] | . |
| DD-COBBLE [8] | _ O BEDR | | | LLS [1] | | • | MODERATE [-1] | Substrate |
| DILHARDPAN [4] | _ DD-DETRI | | | ETLANDS[0] | | | NORMAL [0] | 1/2 |
| D-MUCK [2] 50 10 | _ D-ARTIF NOTE: Ignore | ICIAL[0] Sludge Originating ources | | ARDPAN [0] ANDSTONE [| 01 = 1.05 = 5 | | FREE [1] | [/6] |
| Jacob 1 10 10 10 10 10 10 10 10 10 10 10 10 10 | From Point S | ources | | ANDSTONE [I | NESS: | 4 | ENSIVE [-2] DERATE [-1] | Max 20 |
| NUMBER OF SUBSTRATE TYPE | S: 125 4 or 1 | Aore [2] | | CUSTRINE [0] | | | MAL [0] | |
| (High Quality Only, Score 5 or | | | | IALE [-1] | , | -NON | | |
| COMMENTS | | | | AL FINES [-2 |] | | . – (.) | |
| 2] INSTREAM COVER (Give | e each cover t | ype a score of 0 | to 3; see | back for inst | ructions) | AMOUNT: (| Check ONLY One | or C |
| (Structure) | | Score All That Occ | ur | | | check 2 and | AVERAGE) | Cover |
| UNDERCLIT BANKS [1] | | OOLS> 70 cm [2] | | XBOWS, BACK | | | SIVE > 75% [11] | $\parallel 8 \parallel$ |
| XOVERHANGING VEGETATION | | ROOTWADS [1] | | QUATIC MACRO | | | ATE 25-75% [7] | |
| SHALLOWS (IN SLOW WATER | | OULDERS [1] | _X _L | ogs or wood | Y DEBRIS [1] | | E 5-25% [3] | Max 20 |
| ROOTMATS [1] COMME | | NI V One DED C | | 2D ab a als 0 a | | ■ - NEARL' | Y ABSENT < 5%[1] | |
| 3] CHANNEL MORPHOLOG SINUOSITY DEVELOR | | NLY ONB PER C HANNELIZATION | | JR check 2 a BILITY | | • | | Channel |
| | ELLENT [7] C | | | HIGH [3] | MODIFICA - SNAC | ATIONS/OTHER | - IMPOUND. | CHIEFINIC |
| D - MODERATE [3] D - GOO | | - RECOVERED [| | MODERATE [| | | I - ISLANDS | 5 |
| T-LOW [2] D-FAIR | | - RECOVERING | | LOW [1] | | OPY REMOVAL | | May 20 |
| - NONE [1] - POC | | RECENT OR N | | | - DRE | | - BANK SHAPING | Max 20 |
| . *** | Ŕ | ECOVERY [1] | | | - ONE | SIDE CHANNEL | MODIFICATIONS | |
| COMMENTS: | | ··· | | · | | _ | | |
| 4]. RIPARIAN ZONE AND BA | ANK EROSIO | | | | | | er Right Looking | Downstream (|
| RIPARIAN WIDTH | D (144 D.) | FLOOD PLAIN C | | | ter RIPARI | | BANK EROSION | Riparian |
| | L K (MOST Pre | dominant Per Ba | • | R | | | R (Per Bank) | |
| · · · · · · · · · · · · · · · · · · · | | R OLD FIELD [2] | | I II-CONSERVA I III-URBAN G | | | -NONE/LITTLE [3 | 1 3 |
| | | IAL,PARK,NEW FIL | ยอเม | TIN OPEN PA | STUBE POW | | ¶ -MODERATE [2] □ -HEAVY/SEVERE[| 11Max 10 |
| VERY NARROW <5 m[1] | D D -FENCED 1 | PASTURE [1] | | I -MINING | | | M -LIENA I / DEACKE! | 1,5 |
| DO-NONE [0] | | , , , , , , , , , , , , , , , , , , , | | | | .0.1 [0] | | |
| COMMENTS: | | | | | | | | |
| | | | | | · · · · · · · · · · · · · · · · · · · | | | |
| 5.]POOL/GLIDE AND RIFFLE | | | | | | | | Pool/ |
| MAX. DEPTH | MORPHO | | | <u>CURR</u> | | | 8 & RIFFLES!] | Current |
| (Check 1 ONLY!) | | 2 & AVERAGE) | .4: | | • | All That Apply | • | |
| | | RIFFLE WIDTH [2 RIFFLE WIDTH [1 | | -EDDIES[1 | • | -TORRENTIA | | 9 |
| y • | POOL WIDTH < | | £ . | FAST[1] | | -INTERSTITI | | Max 12 |
| □ - 0.2-0.4m [‡] | . 002 | to rec w. [o] | | SLOW [1] | | -INTERMITTI | • • | |
| | MMENTS: | | | M. STOW [1] | | M -ACKL LYDI | 111 | |
| | | | | | | | | |
| | | CHECK ON | E OR CH | ECK 2 AND | AVERAGE | | | Riffle/Run |
| RIFFLE DEPTH | RUN DEP | <u>TH</u> . ! | RIFFLE/R | UN SUBSTRAT | <u>[E</u> | RIFFLE/RUN | EMBEDDEDNESS | [5]=40 |
| Best Areas >10 cm [2] | X- MAX | | | .g.,Cobble, B | | | ONE [2] | . (|
| ☐ - Best Areas 5-10 cm[1] | □ - MAX | | | BLE (e.g.,Lar | | | OW [1] | Max 8 |
| ☐ - Best Areas < 5 cm | | 13-0 | INS I ABLE | (Fine Gravet | ,5and) [0] | | ODERATE [0] | Gradient |
| [RIFFLE=0] COMMENTS: | | | | - | . NO DIEE | | KTENSIVE [-1] | |
| CONSTILIT I J. | ······································ | 12 | | | - NO KIFFE | E [Metric=0] | • | للصا |
| 6] GRADIENT (ft/mi): | DRAINAG | SE AREA (sq.mi. | 1.62 | .3 % | POOL: [| 40 %G | LIDE: | Max 10 |
| -1 mint (min) | | | , - = | | RIFFLE! | | NUN: 50 | |
| * Rest areas must be large enough to support | | | | | | | | |

Macrobenthos Qualitative Sample List

| ٠. | | | • | | | | | |
|-------------------------------------|---------------------------------------|---|---------------------|--|--|---------------------------|--|---|
| [| | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | | D |
| 21 | Nematomorpha | | | | | | | Parasite Predators/Parasite |
| | Hydracarina- Trombidiformes | Di di | | | 3 | 4 | | Omnivore |
| | | Planaria Congrillidos | | | - | | 0.000 | |
| | Porifera | Spongillidae Corbiculidae | Corbicula | fluminea | 9 | 3.2 | 0.327 | |
| 31 | | | Dreissena | polymorpha | | | 0.000 | |
| | | Unionidae | | iris | | | 0.000 | |
| 18 | | Sphaeriidae | VANOGE | | | 8 | 0.000 | Filters |
| | Gastropoda | Ancylidae | | | | 6 | | Scrapers |
| 20 | Cachopeau | Lymnaeidae | | | | 6.9 | | Scrapers |
| | | Lymnaeidae | Fossaria | | | 6 | | Scrapers |
| 19 | | Physidae | | | 1 | 8 | 0.091 | Scrapers |
| | | Physidae | Physella | | | 8 | | Scrapers |
| ļ | | Planorbidae | | | 1 | 7 | | Scrapers |
| | | Planorbidae | Planorbula | | | 7 | | Scrapers |
| | | Pleuroceridae | | | | | 0.000 | Scrapers |
| | | | Bithynia | tentaculata | | | | Scrapers |
| 1 | | Hirudinea | | | | 10 | | Gathers |
| 25 | | Oligochaeta | | | 12 | | | Gathers |
| | Decapoda | | | | | 8 4 | | Predators Shredders |
| | Amphipoda | | | | 2 | 8 | | Shredders |
| 24 | Ostracoda | Asellidae | | | | 8 | | Scavengers |
| | | Caenidae | | | | 7 | | Gathers |
| - 40 | Ephemeroptera | Caenidae | Caenis | | 2 | 3.1 | | Gathers |
| 13 | | Ephemeridae | Hexagenia | | - | 3.6 | | Gathers |
| 15 | | Baetidae | Baetis | | 4 | 3.1 | | Gathers |
| 13 | | Baetidae | Baetis | brunneicolor | | 4 | | Gathers |
| | | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| | | Baetidae | Callibaetis | | | 5.6 | | Gathers |
| 14 | | Heptageniidae | Stenacron | | | 3.1 | | Scrapers |
| • 1 | | Heptageniidae | Stenacron | gildersteevei | | 3.1 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | | | 4 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | exiguum | | 1.9 | 0.000 | Scrapers |
| | | Isonychiidae | Isonychia | | | 2 | 0.000 | |
| | | Leptohyphidae | Tricorythodes | | | 2.7 | | Gathers |
| | | Siphlonuridae | | 1 | | 7 | | Gathers |
| | | Ephemerellidae | Timpanoga | | | 1 | | Gathers |
| | | Leptophlebiidae | | | | 2 | | Gathers |
| | Coleoptera | Dytiscidae | | | 1 | 5 | | Predators |
| 37 | | Gyrinidae | ļ | | | 5 | 0.000 | Predators |
| | | Gyrinidae | Dineutus | | - | 3.7 | | Predators Predators |
| 27,33 | | Haliplidae | | | - 8 | | | |
| ~~ ~~ | | Dryopidae | | | - | 5 4 | | Predators Gathers |
| 28,32 | - | Elmidae | Deenhanus | | - | 1 - 1 | | |
| | | Psephenidae Hydrophiloidae | Psephenus | | | | | Gathers |
| 7 | | Hydrophiloidae | Tropisternus | | † | - | | Gathers |
| , | Megaloptera | Sialidae | Hopiateittus | | | 4 | | Predators |
| | Megacotera | Corydalidae | Corydalus | | | 4 | | Predators |
| | Trichoptera | Brachycentridae | Brachycentrus | | 1 | 1 | 0.000 | |
| | The lighter of | Helicopsychidae | Helicopsyche | | 1 | 3 | 0.000 | Scrapers |
| | | Helicopsychidae | Helicopsyche | borealis | i | 3 | 0.000 | Scrapers |
| 16 | | Hydropsychidae | | | 3 | 4 | 0.136 | |
| | | Hydropsychidae | Hydropsyche | | | 4 | 0.000 | Filters |
| | | Hydropsychidae | Hydropsyche | betteni | 1 | 4 | 0.000 | Filters |
| | | Hydropsychidae | Hydropsyche | scalaris | | 4 | 0.000 | Filters |
| | | Hydropsychidae | Symphitopsyche | | | 4 | 0.000 | |
| | | Hydroptilidae | | | | 4 | 0.000 | |
| | | Hydroptilidae | Hydroptila | | | 3.2 | | Gathers |
| | | Leptoceridae | | | | 4 | | Shredders |
| | | Leptoceridae | Nectopsyche | | | 4 | | Shredders |
| | | Molannidae | | . | ! | 6 | | Gathers |
| | | Philopotamidae | 11 | <u> </u> | | 3 | 0.000 | |
| | | Phryganeidae | Hagenella | - | | 4 | | Shredders |
| | · · · · · · · · · · · · · · · · · · · | Polycentropodidae | Cyrnelius | - | | 6 2 | | Filters Gathers |
| 200 | Hamintora | Psychomylidae Belostomatidae | Lype | | | - | 0.000 | Predators |
| 36 | Hemiptera | Belostomatidae Belostomatidae | Belostoma | | | + | | Predators Predators |
| 34 | | Corixidae | Devisionia | | + | 10 | | Predators |
| 3 | | Gerridae | | T . | | 5 | | Predators |
| 3 | | Gerridae | Trepobates | t | | 5 | | Predators |
| | | Notonectidae | Notonecta | | | | | Predators |
| | | Nepidae | 1 | | | 1 | 0.000 | Predators |
| | | Nepidae | Ranatra | | 1 | | 0.000 | Predators |
| | Plecoptera | Perlidae | Periesta | | | 1 | 0.000 | Predators |
| | | Perlidae | Neoperla | | | 1 | 0.000 | Predators |
| | | Chloroperlidae | | | | 1 | | Predators |
| | Odonata-Anisoptera | Aeshnidae | | | 1 | 3 | 0.000 | Predators |
| | | Aeshnidae | Boyeria | | | 3 | 0.000 | Predators |
| | | Gomphidae | | ļ | ļ | 1 | | Predators |
| | | Cordulegastridae | - | - | | 3 | | Predators |
| | | Cordulidae | | | 1 | 5 | | Predators Predators |
| 22 | Odonata-Zygoptera | Libellulidae | - | - | + | 9 | | Predators Predators |
| 22 | | Calopterygidae | Calontons | | 14 | 5 3.7 | 0.000 | Predators |
| | Todonata Zygoptora | Calopterygida- | Calopteryx | ; | 16 | 6.1 | | Predators |
| 4 | | Coenagrionidae | 1 | ! | - | 5.1 | | Predators |
| 4 | | Coenagrionidae | Arms | | 1 | | | Predators |
| 4 6 5 | | Coenagrionidae | Argia Engallagma | | | | | |
| 4 | | Coenagrionidae Coenagrionidae | Argie Engallagma | | | 9 | | |
| 4 6 5 | | Coenagrionidae Coenagrionidae Lestidae | | | | 9 | 0.000 | Predators |
| 4 6 5 30 | | Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae | | | 9 | 9 5.7 | 0.000 | Predators Gathers |
| 4 6 5 | Diptera | Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae | | | | 9 | 0.000 0.000 0.828 | Predators Gathers Gathers |
| 4 6 5 30 | Diptera | Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae Other Chironomidae | | | 9 21 | 9 5.7 8.1 | 0.000 0.000 0.828 1.432 | Predators Gathers Gathers Gathers |
| 4 6 5 30 | Diptera | Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae | | | | 9 5.7 8.1 6 | 0.000 0.000 0.828 1.432 0.000 | Predators Gathers Gathers |
| 4 6 5 30 11 12 35 | Diptera | Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae Other Chironomidae Culicidae | | | 21 | 9 5.7 8.1 6 8 | 0.000 0.000 0.828 1.432 0.000 0.136 | Predators Gathers Gathers Gathers Shredders |
| 4 6 5 30 11 12 35 | Diptera | Coenagrionidae Coenagrionidae Lestidae Ceratopogonidae Blood-red Chironomidae Other Chironomidae Culicidae Simuliidae | | | 21 | 9 5.7 8.1 6 8 | 0.000 0.000 0.828 1.432 0.000 0.136 0.000 0.000 | Predators Gathers Gathers Gathers Shredders Filters |

| TAXA RICHNES: | 16 |
|---------------------------------|-------|
| FBI | 5.360 |
| Scraper/Filter | 0.143 |
| EPT/Chironomidae | 0.300 |
| % Contribution of Dominant Taxa | 0.210 |
| EPT Index | 3.000 |
| Community Similarity Indices | 0.389 |
| - | 0.480 |

Comm. Loss = 0.389 Jaccard Coef. = 0.480

CPOM 0.030
Total Number Collected 100

total shredders

3

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

| | | page of |
|------------------|------------------|--|
| STREAM NAME Big | CreeK | LOCATION Emal Road Station 5 |
| STATION#_5 | RIVERMILE | STREAM CLASS |
| LAT 38° 8.603 N | LONG 87 43.339N | RIVER BASIN |
| STORET# | | AGENCY |
| COLLECTED BY E>B | WGL DATE 4/28/04 | LOT# |
| TAXONOMIST ESB. | NGL DATE | SUBSAMPLE TARGET 🗆 100 🗆 200 🗀 300 🗀 Other |

| 0 | rganisms | | No. | LS | TI | TCR | . 0 | rganisms | No. | LS | TI | TCR | |
|-----------------|-------------------------------------|------------|---------|----------------------|-------|-----|----------------------|--|-----|-----|------------|-----|----------|
| Oligochaeta | 11/1 | 3 | 16 | ٨ | 666 | | Megaloptera | | | | | | |
| Hirudinea | | | | | | • | Coleoptera | MARIANE - 1 | 2 | I | wee | , | 0 |
| Isopoda | | | | | | • | Elvin / | longtoe -477 (1 | 7 | A. | μu | 1 | ③ |
| • | | | | | | | | | | | | | ######## |
| Amphipoda | m111 | <u>(4)</u> | 8 | 1 | ١١ | • | Diptera | Brackin- LIMINA | | | | | MATHET |
| Decapoda | | | | | | • | • (| Bloodred - LHT 11 Simulia - LHT 11 | 110 | 1 + | W6L | , | 96 |
| | | | | | | | رم | Brown Chironial | 2 | I | 146 L | , (|) 38) |
| Ephemeroptera | Bartid-JH Canid-1 | MITH | , , , , | | ratt | THI | * ; ; | 1114 2411 25 | | | | | |
| | CANIG- I | (B) | 7 38 | <u>†</u> | الالا | 1 | Gastropoda | LAHS - 7/1/ (2) | 8 | A | <u>46L</u> | 1 | |
| • | | <u> </u> | | -#- | ا | | | | | | | | |
| Discontant | | | | | | • | Pelecypoda | Eurasian -1 | 1 | A | W6L | 1 | |
| Plecoptera | | | | | | | | | | • | | | |
| | | | | | | · | Other Plana | ria - 111 | 3 | A | WGL | , | 1 |
| | | | | | | | Horse dame! Broad | hair - 1442 Paddle - 1471 | 8 | A | wbl | 1 | <u> </u> |
| Trichoptera | Hydro-111 | 0 | 8 | I | w6 L | , • | calip | 279-4411113 | 9 | セ | 66L | / | עב |
| | | | | | | • | dragon | Py - 111 0 | 2 | I | 16L | 1 | . • |
| | | | | | | | River | 3111-1 | | , | | - | |
| | | | | | | | | <u>g </u> | · | | | | |
| • | | | | | | | · | . * | | | | | |
| -lemiptera | · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | |
| axonomic certai | | | | | | | | | | | | | |

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition - Form 3

Total No. Organisms 100

Total No. Taxa 14

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME | ١٩ | < | [re | ek | < | LOCATION E | ma | ٩ | R | pac | Station. | 5 | | | | |
|-------------------------------------|-----|--------|--------|------|-----|--|---------------|-------|-------------|-------|----------------------------|------------|---------|-----|-----------|------|
| STATION #_5 | R | IVE | RMI | LE_ | | STREAM CLASS | STREAM CLASS | | | | | | | | | |
| LAT | _ L | ONO | 3 | | | RIVER BASIN | RIVER BASIN | | | | | | | | | |
| STORET# | | | | | | AGENCY | AGENCY | | | | | | | | | |
| INVESTIGATORS | E. | >B | s,U | 40 | در | | | | I | LOT | NUMBER | | | | | |
| FORM COMPLETED | | | >[| 3 | | DATE 4/28/0 | X AM | PМ | | REA! | SON FOR SURVEY | | | | | |
| HABITAT TYPES | Ø | Cot | ble_ | 5 | _% | age of each habitat type Snags % hytes 0 % | prese Vege | tated | Ban ther | iks_/ | <i>O</i> % □ Sand <u>(</u> | <u>ラ</u> % | · · · · | | | |
| SAMPLE COLLECTION | | | | | | ne Akick-net es collected? Awadi | | Other | | m ba | nk 🚨 from bo | - at | | • | | |
| | Ţ, | ıdica | ate ti | he n | umb | of jabs/kicks taken in each | ach h | ahita | it tv | ne. | | _ | | | | |
| GENERAL COMMENTS | | | | | | · | | | | • | | | | | | |
| | | | | | | | | | | | | | | | | |
| QUALITATIVE L Indicate estimated | | | | | | TIC BIOTA sent/Not Observed, 1 | : = R | are, | .2= | = Co | mmon, 3= Abunda | ant, 4 |] = I | Oom | inar | nt |
| Periphyton | | | | | 0 | 1) 2 3 4 | Sli | mes | | | | 0 | 1 | 2 | _ | 4 |
| Filamentous Algae | | | | | 0 | \mathfrak{D} 2 3 4 \cdot | Ma | croi | nver | rtebr | ates | 0 | 1 | 2 | ③ | 4 |
| Macrophytes | | | | | 0 | 1 2 3 4 | Fis | h | | | | 0 | 1 | ري | 3 | 4 |
| FIELD OBSERVA Indicate estimated | | | | | 0 = | DBENTHOS bsent/Not Observed, nisms), 3= Abundant (| | | | | ganisms), 2 = Con | | | | m!a i) | *10a |
| Porifera | 0 | 1 | _ | _ | 4 | Anisoptera 0 | 1 | 2 | | 4 | l | 0 | 1 | 2 - | 3 | 4 |
| Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygoptera 0 | _ | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes | 0 | 1 | 2 | 3 | 4 | Hemiptera 0 | _ | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Turbellaria Hirudinea | 0 | 1 | 2 | 3 | 4 | Coleoptera 0 | | 2 | 3 | 4 | Other | 0 | 1 | 2 | 3 | 4 |
| Oligochaeta | 0 | 1 1 | 2 | 3 | 4 | Lepidoptera 0 Sialidae 0 | | 2 | 3 | 4 | | | | | | |
| Isopoda | 0 | 1 | . 2 | 3 | 4 | Siandae 0 Corydalidae 0 | - | 2 | 3 | 4 | • | | | | | |
| Amphipoda | 0 | 1 | 2 | 3 | 4 | Tipulidae 0 | 1 | 2 | 3 | 4 | | | | • | | |
| Decapoda | 0 | 1 | 2 | 3 | 4 | Empididae 0 | _ | 2 | 3 | 4 | | | | | | |
| Gastropoda | 0 | 1 | 2 | 3 | 4 | Simuliidae 0 | _ | 2 | 3 | 4 | | | | | | |
| Bivalvia | | | | | | | _ | _ | | | | | | | | |
| | 0 | 1 | 2 | 3 | 4 | Tabinidae 0 | 1 | 2 | 3 | 4 | | | | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| STREAM NAME Big Creek | LOCATION Emae Road Station 5 |
|--|--------------------------------|
| STATION #_STATION #_STATIO | STREAM CLASS |
| LAT 38 8.603 N LONG 87 43.339 | PRIVER BASIN |
| STORET # | AGENCY |
| INVESTIGATORS Amy, Gary, Ronnie, W | ally, EDB |
| FORM COMPLETED BY ESB, WGC | DATE 4/28/04 REASON FOR SURVEY |

| | WEATHER CONDITIONS | Now 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | storm (heavy rain) rain (steady rain) showers (intermitten %cloud cover clear/sunny | Air Air | Temperatur | | the last 7 days? |
|-------|---------------------------|--|---|----------------------------|------------------|-----------------|------------------|
| DFLB | SITE LOCATION/M | AP Draw a map | | te the areas sampled | or attach a | photograph) | 5. |
| | DEPTH VELF | SE DFLB | Depth St. | Velocity A/sec | OFLB | Deptaff | Vel. Sec |
| 1.5 | 0,9 1.61 | 1.5 | 1.0 | 0,57 | 15 | 1.2 | (-0.12) |
| 3.0 | 1.4 0.92 | 11 | 1.2 | 0.72 | 30 | 1.7 | 0.02 |
| - 4.5 | 1.3 1.53 | 4.5 | 1.3 | 0,76 | 4,5 | 1.7 | 0.58 |
| 4.0 | 1.1 1.69 | .6.0 | 1,4 | 0.79 | 6.0 | 1.8 | 0.29 |
| | | 7.5 | 1.4 | 0.74 | 7.5 | 1.0 | (-0.14) |
| 7.5 | | 9.0 | 2.1 | 0.66 | 9.0 | 1.6 | 0,20 |
| 9.0 | 0.6 1.50 | 10.5 | 2.0 | 0.61 | 10.5 | 1.5 | 1.24 |
| 10.5 | 0.8 0.77 | 12.0 | 2.6 | 0.45 | 12.0 | 1,6 | 1.39 |
| 12.0 | 0.9 0.72 | 13,5 | · 2.7 | 0.51. | 13.5 | 1.3 | 1.01 |
| 13.5 | 1.0 0.13 | 15.0 | 2.5 | 0.40 | 15.0 | 1.3 | |
| 15.0 | 0.4 .0.91 | 16.5 | 2.2 | 0.27 | 16.5 | 1.3 | 0,94 |
| 16.5 | 0.7 0.72 | 18.0 | 2,2 | 0.22 | 18.0 | [11] | 0.48 |
| 18.0 | 0.2 0.56 | 19,5 | 211 | 0.08 | 19.5 | 0.9 | 0.51 |
| 19.5 | 6.3 0.18 | 21,0 | 1,4 | 0.13 | 21.0 | 0.7 | 0.46 |
| 21 | NOREADINE | 2a,5 | 111 | (-0.02) | 22.5 | 0.5 | 0.46 |
| • | | | | | 24 | 0.2 | 0.25 |
| 75.0= | RIGHT BANK | 24.0= | RT BANK | - | 25.5 | 0,4 = RT, BA | 0.39. NK |
| | STREAM CHARACTERIZATIO | / | | Strea Tidal Col | m Type dwater | | |
| | | Stream Origin Glacial Non-glacial Swamp and I | Spring | -fed Catch e of origins | ment Area_ | km² | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET RECED TO A CHARACTERIZATION PHYSICAL CHARACTERIZATION PHYSICATION PHYSICAL CHARACTERIZATION (BACK)

| Dia | -ueek |
|-------|-------|
| Emal | Road |
| -mage | reac |

| WATERSHED FEATURES | Predominant Surrounding Landuse Forest Commercial Field/Pasture Industrial Agricultural Other Residential | Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy |
|---|--|--|
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and record the dominant Trees O Shrubs dominant species present Reed Cana | |
| INSTREAM FEATURES | Estimated Reach Length Om Estimated Stream Width Om Sampling Reach Area m² Area in km² (m²x1000) km² Estimated Stream Depth m Surface Velocity m/sec (at thalweg) | Canopy Cover Partly open Partly shaded Shaded High Water Mark |
| LARGE WOODY DEBRIS | LWDm² Density of LWDm²/km² (LWD/ reac | ch area) |
| AQUATIC VEGETATION | Indicate the dominant type and record the domi Rooted emergent Rooted submergent Floating Algae Attached Algae dominant species present Portion of the reach with aquatic vegetation | ☐ Rooted floating ☐ Free floating |
| WATER QUALITY | Temperature 61.6 ° RF 16.4° C Specific Conductance 534.4 Dissolved Oxygen 93207 pH 8.13 Turbidity 21.1 WQ Instrument Used Instru | Water Odors Normal/None Sewage Petroleum Chemical Fishy Other Water Surface Oils Slick Sheen Globs Flecks None Other Turbidity (if not measured) Clear Slightly turbid Turbid Opaque Stained Other |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage Petroleum Chemical Anaerobic None Other Oils Absent Slight Moderate Profuse | Deposits Sludge Sawdust Paper fiber Sand Cher Looking at stones which are not deeply embedded, are the undersides black in color? Yes No |

| INC | ORGANIC SUBSTRATE (should add up to 1 | | | ORGANIC SUBSTRATE CO | | | |
|-------------------|---------------------------------------|------------------------------------|-------------------|----------------------------|-----------------------------------|--|--|
| Substrate Type | Diameter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | |
| Bedrock | | | Detritus | sticks, wood, coarse plant | 2% | | |
| Boulder | > 256 mm (10") | 10 | 1 | materials (CPOM) | 210 | | |
| Cobble | 64-256 mm (2.5"-10") | VD | Muck-Mud | black, very fine organic | | | |
| Gravel | 2-64 mm (0.1"-2.5") | 10 | 1 | (FPOM) | | | |
| Sand | 0.06-2mm (gritty) | 10 | Mari | grey, shell fragments | | | |
| Silt | 0.004-0.06 mm | 40 | 1 | | | | |
| Clay | < 0.004 mm (slick) | 20 | 1 | | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME BIQ CreeK | LOCATION Enge Road | Station 5 | |
|------------------------------------|-------------------------------------|-----------------|--|
| STATION# 5 RIVERMILE | STREAM CLASS | | |
| LATLONG | RIVER BASIN | | |
| STORET# | AGENCY | | |
| INVESTIGATORS Amy, Ronnie, Gary, U | vally, EDB | | |
| FORM COMPLETED BY | DATE 4/28/04 RE TIME 14:00 AM PM | ASON FOR SURVEY | |

| 3 | Habitat Parameter | | Condition | Category | |
|--|---|---|---|---|---|
| | T at affecter | Optimal | Suboptimal | Marginal | Poor |
| ч | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| reac | SCORE 2 | 7,02,4510,020,33,500,700,70 | STATE STATES OF | | |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ated | SCORE 6 | | 152,143,45552,510 | | |
| to be evalu | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| eters | SCORE 13 | | | 0.2000 | |
| Parame | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | score 7 | At Artest States | | | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| | SCORE 16 | 200 20191 2018 2017 (106 | 156163 4.2.1 0.118 | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat | | Condition | Category | |
|--|---|--|--|---|---|
| Ì | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| | score 6 | 20: 319: 318 \$ 17:5516. | /45 (4 H) -(12 H) L | 10 95398 36 | |
| pling reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note-channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| Sam | score Z | 20 (19, 115) 17(6)46 | ans, and Care Special R | 99-38-55 | \$30.52 E. Vir. 6 |
| Parameters to be evaluated broader than sampling reach | 8. Bank Stability (score each bank) Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30- 60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| e evalua | SCORE (LB) SCORE (RB) | TENERGY SYNCERS & | | And the second | |
| Parameters to b | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE 3 (LB) | Patrick Co. | e e e e e e e e e e e e e e e e e e e | | |
| . • | SCORE <u>5</u> (RB) | | | | |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| , | SCORE (LB) SCORE (RB) | recently so | | | |

Total Score 64

| | 5 _ | | | A |
|---|------------|-----|--|----------|
| U | . 1 | (2- | | |

| | 40.5 |
|--|--|
| River Code:RM:Stream: Big Creek | |
| Date: 4/28/04 Location: Emac Road Station 5 | |
| Scorers Full Name: Ed Belmonte_Affiliation:V3 | |
| 1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present | |
| TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY | |
| □□-BLDR /SLBS(10) □□-GRAVEL [7] □ Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE) |) |
| DI BOULDER [9] DI SAND [6] DI -LIMESTONE [1] SILT: DI-SILT HEAVY [-2] | |
| | Substrate |
| -SILT NORMAL [0] | |
| DEARTIFICIAL(0) 5 0 0 HARDPAN [0] 0 -SILT FREE [1] | 3 |
| From Point Sources La SARDSTORE [0] EMBEDDED LA EXTENSIVE [-2] | Max 20 |
| NUMBER OF SUBSTRATE TYPES: 12-4 or More [2] | |
| (Ulanh Arralder, Ambr. Conna Conn.) | |
| COMMENTS | |
| 2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One of the content | · · · · · · · · · · · · · · · · · · · |
| (Structure) TYPE: Score All That Occur check 2 and AVERAGE) | " Cover |
| UNDERCUT BANKS [1]OXBOWS, BACKWATERS [1] EXTENSIVE > 75% [11] | |
| ** OVERWANGING VEGETATION [1]ROOTWADS [1]AQUATIC MACROPHYTES [1] EI - MODERATE 25-75% [7] | |
| SHALLOWS (IN SLOW WATER) [1]LOGS OR WOODY DEBRIS [1] # SPARSE 5-25% [3] | Max 20 |
| ROOTHATS [1] COMMENTS: II - NEARLY ABSENT < 5%[1] | |
| 3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE) | |
| SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER | Channel |
| □ - HIGH [4] □ - EXCELLENT [7] □ - NONE [6] □ - HIGH [3] □ - SNAGGING □ - IMPOUND. | 5 |
| □ - MODERATE [3] □ - GOOD [5] □ - RECOVERED [4] □ - MODERATE [2] □ - RELOCATION □ - ISLANDS | |
| - LOW [4] | Max 20 |
| | |
| COMMENTS: | |
| 4]. RIPARIAN ZONE AND BANK EROSION check ONE box per bank or check 2 and AVERAGE per bank) PRiver Right Looking | Downstream (|
| RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION | |
| 1 5 75 5 13 | |
| E IV (I OF DATIV) E IV (MOST FIROUTHIBITE FOI DATIV) E IV (MOST FIROUTHIBITE FOI DATIV) | Riparian |
| # In the second | |
| WIDE > 50m [4] | 2.5 |
| TO - WIDE > 50m [4] DEFOREST, SWAMP [3] DE-CONSERVATION TILLAGE [1] DE-NONE/LITTLE [3] - MODERATE 10:50m [3] DE-SHRUB OR OLD FIELD [2] DE-HEAVY/SEVEREI DE-NOME [2] DE-HEAVY/SEVEREI DE-HEAVY/SEV | 2.5 |
| TO - WIDE > 50m [4] DEFOREST, SWAMP [3] DE-CONSERVATION TILLAGE [1] DE-NONE/LITTLE [3] - NONE/LITTLE [3] DE-SHRUB OR OLD FIELD [2] DE-URBAN OR INDUSTRIAL [0] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HINING/CONSTRUCTION [0] | 2.5 |
| DO-WIDE > 50m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D | 2.5 |
| TO - WIDE > 50m [4] DEFOREST, SWAMP [3] DE-CONSERVATION TILLAGE [1] DE-NONE/LITTLE [3] - NONE/LITTLE [3] DE-SHRUB OR OLD FIELD [2] DE-URBAN OR INDUSTRIAL [0] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HEAVY/SEVERE[1] DE-HINING/CONSTRUCTION [0] | 2.5 |
| DO-WIDE > 50m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-MODERATE [4] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MINING/CONSTRUCTION [0] COMMENTS: | 2.5 |
| DO-WIDE > 50m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-MODERATE 10-50m [3] D-SHRUB OR OLD FIELD [2] D-URBAN OR INDUSTRIAL [0] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MINING/CONSTRUCTION [0] D-MINING/CONSTRUCTION [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY | 1]Max 10 |
| Display of the policy of the p | 1 2.5 1]Max 10 |
| DO-WIDE > 50m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-MODERATE 10-50m [3] D-SHRUB OR OLD FIELD [2] D-WIBAN OR INDUSTRIAL [0] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MINING/CONSTRUCTION [0] D-HEAVY/SEVERE[D-NONE [0] D-MINING/CONSTRUCTION [0] D-MINING/CONSTRUCT | 1]Max 10 |
| DO-WIDE > 50m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-NONE/LITTLE [3] D-MODERATE 10-50m [3] D-SHRUB OR OLD FIELD [2] D-URBAN OR INDUSTRIAL [0] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MODERATE [2] D-MINING/CONSTRUCTION [0] D-HEAVY/SEVERE[D-NONE [0] D-MINING/CONSTRUCTION [0] D-MINING/CONSTRUCT | 1]Max 10 |
| Display of the pool width riffle width [1] Display of the pool width riffle width ri | 1]Max 10 |
| DO-WIDE > 50m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-SHRUB OR OLD FIELD [2] D-RESIDENTIAL, PARK, NEW FIELD [1] D-HEAVY/SEVERE[D-NONE [0] D-HANING/CONSTRUCTION [0] D-HEAVY/SEVERE[D-NONE [0] D-HONE/SEVERE[D-NONE [| Pool/ Current |
| Display Som [4] Display or old field [2] Displ | Pool/ Current |
| DID- WIDE > 50m [4] DID-FOREST, SWAMP [3] DID-CONSERVATION TILLAGE [1] DID-NONE/LITTLE [3] DID-NONE/LITTLE [3] DID-NONE/LITTLE [3] DID-NONE [4] DID-SHRUB OR OLD FIELD [2] DID-NONE [6] DID-NONE [7] DID-NONE [8] DID-FENCED PASTURE [1] DID-HEAVY/SEVERE [8] DID-NONE [8 | Pool/ Current Max 12 |
| DIP- WIDE > 50m [4] DIP-FOREST, SWAMP [3] DIP-CONSERVATION: TILLAGE [1] DIP-NONE/LITTLE [3] DIP-HEAVY/SEVERE [2] DIP-HEAVY/SEVERE [2] DIP-HEAVY/SEVERE [2] DIP-HEAVY/SEVERE [3] DIP-HEAVY/SEVERE [4] DIP-HEAVY/SEVERE [4] DIP-HEAVY/SEVERE [5] DIP-HEAVY/SEVERE [6] DIP-HEAVY/SEVER [| Pool/ Current Max 12 Riffle/Run |
| COMMENTS: COMENTS: COMMENTS: C | Pool/ Current Max 12 Riffle/Run |
| DI-WIDE > 50m [4] DI-FOREST, SWAWP [3] DI-CONSERVATION TILLAGE [1] ONNE/LITTLE [3] DI-MODERATE 10:50m [3] DI-SHRUB OR OLD FIELD [2] DI-URBAN OR INDUSTRIAL [0] DI-MODERATE [2] DI-MODERATE [3] DI-MODERATE [4] DI-MODERATE [4] DI-MODERATE [5] DI-MODERATE [6] DI-MODERATE [6] DI-MODERATE [6] DI-MODERATE [7] DI-MODERATE [7] DI-MODERATE [8] DI-MODERATE [8] DI-MODERATE [9] DI-MODERATE [1] | Pool/ Current Max 12 Riffle/Run |
| DI-WIDE > 50m [4] DI-FOREST, SWAMP [3] DI-SHRUB OR OLD FIELD [2] DI-URBAN OR INDUSTRIAL [0] DI-MODERATE 10-50m [3] DI-SHRUB OR OLD FIELD [2] DI-URBAN OR INDUSTRIAL [0] DI-MODERATE [2] DI-MODERATE [2] DI-RESIDENTIAL, PARK, NEW FIELD [1] DI-WIDEN PASTURE, ROWCROP [0] DI-HEAVY/SEVERE[| Pool/ Current Max 12 Riffle/Run 6 Max 8 |
| Conservation: Tillage [1] | Pool/ Current Max 12 Riffle/Run |
| D-WIDE > 59m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-MODERATE 10-50m [3] D-SHRUB OR OLD FIELD [2] D-URBAN OR INDUSTRIAL [0] D-MODERATE [2] D-MODERATE [3] D-MODERATE [4] D-MODERATE [5] D-MODERATE [6] D-MODERATE [6] D-MODERATE [7] D | Pool/ Current Max 12 Riffle/Run 6 Max 8 |
| Display Disp | Pool/ Current Max 12 Riffle/Run 6 Max 8 Gradient |
| D-WIDE > 59m [4] D-FOREST, SWAMP [3] D-CONSERVATION TILLAGE [1] D-NONE/LITTLE [3] D-MODERATE 10-50m [3] D-SHRUB OR OLD FIELD [2] D-URBAN OR INDUSTRIAL [0] D-MODERATE [2] D-MODERATE [3] D-MODERATE [4] D-MODERATE [5] D-MODERATE [6] D-MODERATE [6] D-MODERATE [7] D | Pool/ Current Max 12 Riffle/Run 6 Max 8 |

Macrobenthos Qualitative Sample List

| ٠, | 00000 | FARM V | GENUS | SPECIES | COUNT | TOLERANCE VALUES | EBI | |
|-------------------------------------|---|---|---------------------------------------|--|--|--|---|---|
| | | FAMILY | GENUS | SPECIES | 4 | TOLERANCE VALUES | | Parasite |
| | Nematomorpha Hydracarina- Trombidiformes | | | | 1 | | | Predators/Parasite |
| | Tubellaria | Planaria | | | | 4 | 0.000 | Omnivore |
| | Porifera | Spongillidae | | | | · · · · · · · · · · · · · · · · · · · | 0.000 | Filters |
| 31 | Pelecypoda | Corbiculidae | Corbicula | fluminea | | 3.2 | 0.000 | Filters |
| - " | | | Dreissena | polymorpha | - | | 0.000 | |
| | | Unionidae | Villosa | iris | | | 0.000 | Filters |
| 18 | | Sphaerlidae | | | | 8 | 0.000 | Filters |
| | Gastropoda | Ancylidae | | | | 6 | 0.000 | Scrapers |
| 20 | | Lymnaeidae | | | | 6.9 | | Scrapers |
| ı | | | Fossaria | | | 6 | | Scrapers |
| 19 | | Physidae | | | 2 | 8 | | Scrapers |
| 1 | | Physidae | Physella | | | 8 | 0.000 | Scrapers |
| [| | Planorbidae | | | | 7 | | Scrapers |
| | | Planorbidae | Pianorbula | | | 7 | 0.000 | Scrapers |
| - 1 | | Pleuroceridae | Piu I | | | | | Scrapers |
| | | Bithyniidae | Bithynia | tentaculata | | | | Scrapers |
| | Annelida | Hirudinea | | | 3 | 10 | | Gathers Gathers |
| 25 26 | Decemeda | Oligochaeta | | | | 8 | 0.000 | Predators |
| | Decapoda Amphipoda | | | | 4 | 4 | | Shredders |
| 24 | Isopoda | Asellidae | | | | 8 | | Shredders |
| | Ostracoda | / Bolindaro | | | | 8 | | Scavengers |
| | Ephemeroptera | Caenidae | | | | 7 | | Gathers |
| 13 | | Caenidae | Caenis | | 1 | 3.1 | | Gathers |
| | | Ephemeridae | Hexagenia | | L | 3.6 | 0.000 | Gathers |
| 15 | | Baetidae | Baetis | | 18 | 3.1 | 0.607 | Gathers |
| | | Baetidae | Baetis | brunneicolor | | 4 | 0.000 | Gathers |
| | | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| | | Baetidae | Callibaetis | | | 5.6 | | Gathers |
| 14 | | Heptageniidae | Stenacron | L | | 3.1 | | Scrapers |
| | | Heptageniidae | Stenacron | gildersleevei | | 3.1 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | <u> </u> | | 4 | | Scrapers |
| | | Heptageniidae | Stenonema | exiguum | - | 1.9 | | Scrapers |
| | | Leptohyphidae | Tricorythodes | | | 2.7 | | Gathers |
| | ļ | Siphionuridae | Townson - | 1 | | 7 | | Gathers |
| | | Ephemerellidae | Timpanoga | | | 1 2 | | Gathers |
| | Calconters | Leptophlebiidae | - | 1 | | 5 | | Gathers Predators |
| 37 | Coleoptera | Dytiscidae | | | + | 5 | 0.000 | Predators |
| 31 | | Gyrinidae Gyrinidae | Dineutus | - | 1 | 3.7 | 0.000 | Predators |
| 27,33 | | Haliplidae | Directos | | 1 | 7 | | Predators |
| 21,00 | 1 | Dryopidae | | | | 5 | | Predators |
| 28,32 | | Elmidae | | | 4 | 4 | | Gathers |
| | | Psephenidae | Psephenus | | | 4 | 0.000 | Scrapers |
| | | Hydrophiloidae | i ' | 1 | 1 | | 0.000 | Gathers |
| 7 | | Hydrophiloidae | Tropisternus | | | | | Gathers |
| | Megaloptera | Sialidae | | | | 4 | 0.000 | Predators |
| | | Corydalidae | Corydalus | | | 4 | 0.000 | Predators |
| | Trichoptera | Brachycentridae | Brachycentrus | | | 11 | | Filters |
| | | Helicopsychidae | Helicopsyche | | 1 | 3 | | Scrapers |
| | | Helicopsychidae | Helicopsyche | borealis | . | 3 | | Scrapers |
| 16 | · · · · · · · · · · · · · · · · · · · | Hydropsychidae | I landen a same | | ' | 4 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | betteni | + | 4 | | Filters Filters |
| | | Hydropsychidae Hydropsychidae | Hydropsyche Hydropsyche | scalaris | + | 4 | | Filters |
| | | Hydropsychidae | Symphitopsyche | - DOUBLE TO | + | 4 | | Filters |
| | | Hydroptilidae | · · · · · · · · · · · · · · · · · · · | <u> </u> | 1 | 4 | | Gathers |
| | | Hydroptilidae | Hydroptila | | | 3.2 | | Gathers |
| | | Leptoceridae | | | | 4 | 0.000 | Shredders |
| | | Leptoceridae | Nectopsyche | | | 4 | 0.000 | Shredders |
| | | Molannidae | | | | 6 | | Gathers |
| | | Philopotamidae | | | | 3 | 0.000 | Filters |
| | | Phryganeidae | Hagenella | L | L | 4 | 0.000 | Shredders |
| | | Polycentropodidae | Cymellus | | | 6 | 0.000 | Filters |
| | | Psychomylidae | Lype | | \perp | 2 | | Gathers |
| 36 | Hemiptera | Belostomatidae | | | ļ | L | | Predators |
| | | Belostomatidae | Belostoma | ļ | | ļ | | Predators |
| 34 | | Corixidae | | | | 10 | 0.000 | Predators |
| 3 | | Gerridae | Transhat | | + | 5 | 0.000 | Predators Predators |
| | | Gerridae | Trepobates | | + | 5 | | Predators |
| | <u> </u> | Notonectidae Nepidae | Notonecta | | + | | | Predators Predators |
| | | Nepidae | Ranatra | | + | | | Predators |
| | Piecoptera | Perlidae | Periesta | † | 1 | 1 | 0.000 | Predators |
| | | Pertidae | Neoperla | † | | <u> </u> | | Predators |
| | | Chloroperlidae | 1 | | 1 | i | | Predators |
| | Odonata-Anisoptera | Aeshnidae | | T | T | 3 | | Predators |
| | | Aeshnidae | Boyeria | | | 3 | 0.000 | Predators |
| | | | | 1 | 1 | 1 | | Predators |
| | | Gomphidae | | | | | | Predators |
| | | Gomphidae Cordulegastridae | | | | 3 | | |
| 22 | | Gomphidae Cordulegastridae Cordulidae | | | 1 | 5 | 0.054 | Predators |
| 22 | | Gomphidae Cordulegastridae Cordulidae Libellulidae | | | 1 | 5 9 | 0.054 | Predators Predators |
| 22 | Odonata-Zygoptera | Gomphidae Cordulegastridae Corduliidae Libeilulidae Calopterygidae | | | 1 | 5 9 5 | 0.054 0.000 0.000 | Predators Predators Predators |
| 4 | Odonata-Zygoptera | Gomphidae Cordulegastridae Corduliidae Libeilulidae Calopterygidae Calopterygidae | Calopteryx | | 1 5 | 5 9 5 3.7 | 0.054 0.000 0.000 0.201 | Predators Predators Predators Predators |
| 4 | Odonata-Zygoptera | Gomphidae Cordulegastridae Cordulidae Libeilulidae Calopterygidae Calopterygidae Coenagrionidae | | | 1 5 7 | 5 9 5 3.7 6.1 | 0.054 0.000 0.000 0.201 0.464 | Predators Predators Predators Predators Predators |
| 4 6 5 | Odonata-Zygoptera | Gomphidae Cordulegastridae Cordulegastridae Libellulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae | Argia | | | 5 9 5 3.7 | 0.054 0.000 0.000 0.201 0.464 0.000 | Predators Predators Predators Predators Predators Predators Predators |
| 4 | Odonata-Zygoptera | Gomphidae Cordulegastridae Cordulidae Libeilulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Goenagrionidae | | | | 5 9 5 3.7 6.1 5.1 | 0.054 0.000 0.000 0.201 0.464 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators |
| 4 6 5 | Odonata-Zygoptera | Gomphidae Condulégastriciae Cordulidae Libeilulidae Libeilulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lesticiae | Argia | | | 5 9 5 3.7 6.1 5.1 | 0.054 0.000 0.201 0.464 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predator: Predator: |
| 4 6 5 30 | Odonata-Zygoptera | Gomphidae Cordulegastridae Cordulidae Libelluldae Calopterygidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Lestidae | Argia | | 7 | 5 9 5 3.7 6.1 5.1 5.1 5.7 | 0.054 0.000 0.201 0.464 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predator: Predator: Gathers |
| 4 6 5 30 | Odonata-Zygoptera | Gomphidae Cordulaçastridae Cordulaçastridae Libelluldae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Lestidae Lestidae Lestidae Lestidae Lestidae Lestidae | Argia | | 7 | 5 9 5 3.7 6.1 5.1 4 5 5.7 8.1 | 0.054 0.000 0.201 0.464 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predator: Gathers Gathers |
| 4 6 5 30 | Odonata-Zygoptera Diptera | Gomphidae Cordulagastrisae Cordulagastrisae Corduladae Libelluldae Calopterygidae Calopterygidae Coenagnoridae Coenagnoridae Coenagnoridae Coenagnoridae Lestidae Lestidae Ceratopogoridae Blood-red Chronomidae Other Chronomidae | Argia | | 7 | 5 9 5 3.7 6.1 5.1 \$\frac{\xi}{\xi}\$ 5.7 8.1 6 | 0.054 0.000 0.000 0.201 0.464 0.000 0.000 0.000 0.000 0.440 2.478 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predator: Gathers Gathers Gathers |
| 4 6 5 30 11 12 35 | Odonata-Zygoptera Diptera | Gomphidae Cordulagastriciae Cordulagastriciae Corduladae Libelluldae Calopterygidae Calopterygidae Coenagrionidae Coulodae | Argia | | 7 | 5 9 5 3.7 6.1 5.1 4 5 5.7 8.1 | 0.054 0.000 0.000 0.201 0.464 0.000 0.000 0.000 0.000 0.4478 2.478 | Predators Gathers Gathers Gathers Gathers |
| 4 6 5 30 11 12 35 | Odonata-Zygoptera Diptera | Gomphidae Cordulagastrisae Cordulagastrisae Corduladae Libelluldae Calopterygidae Calopterygidae Coenagrioridae Coenagrioridae Coenagrioridae Coenagrioridae Lestidae Lestidae Ceratopogoridae Blood-red Chronomidae Other Chronomidae Culicidae Simulidae | Argia | | 7 5 38 | 5 9 6 3.7 6.1 5.1 ½ 5 5.7 8.1 6 | 0.054 0.000 0.000 0.201 0.464 0.000 0.000 0.000 0.440 2.470 0.000 | Predators Gathers Gathers Gathers Shredders Filters |
| 4 6 5 30 11 12 35 | Odonata-Zygoptera Diptera | Gomphidae Cordulagastriciae Cordulagastriciae Corduladae Libelluldae Calopterygidae Calopterygidae Coenagrionidae Coulodae | Argia | | 7 5 38 | 5 9 6 3.7 6.1 5.1 \$ \$ 5.7 8.1 6 | 0.054 0.000 0.000 0.201 0.464 0.000 0.000 0.000 0.440 2.478 0.000 0.391 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predator: Gathers Gathers Gathers Shredders Filters Predators |
| 4 6 5 30 11 12 35 | Odonata-Zygoptera Diptera | Gomphidae Cordulagastriciae Cordulagastriciae Cordulagastriciae Cordulagas Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Sicod-red Chironomidae Citter Chironomidae Citter Chironomidae Simulidae Simulidae | Argia | | 7 5 38 | 5 9 6 3.7 6.1 5.1 \$ \$ 5.7 8.1 6 | 0.054 0.000 0.201 0.484 0.000 0.000 0.000 0.000 0.4440 0.4440 0.000 0.391 0.000 | Predators Gathers Gathers Gathers Shredders Filters |

| TAXA RICHNESS | 15 |
|---------------------------------|-------|
| FE' | 5.235 |
| Scraper/Filtr | 0.25 |
| EPT/Chironomica | 0.467 |
| % Contribution of Dominant Taxa | 0.380 |
| EPT Index | 3.000 |
| Community Cincilnates Indiana | 0.500 |

Comm. Loss = 0.467 Jaccard Coef. = 0.478

Total Number Collected
total shredders

4

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

page STREAM NAME RUSK Creek LOCATION Harmonie State Park STATION# RIVERMILE STREAM CLASS LAT LONG RIVER BASIN STORET# **AGENCY** COLLECTED BY EDB, WEL. AS DATE 10/12/04 LOT# **TAXONOMIST** DATE SUBSAMPLE TARGET □ 100 □ 200 □ 300 □ Other Enter Family and/or Genus and Species name on blank line. **Organisms** No. TI TCR **Organisms** No. LS TI TCR Oligochaeta Megaloptera Hirudinea Coleoptera ന larvae - Halinia 11 Isopoda Z (2) 11) Amphipoda **(3**) X A Diptera Larme WI WILL Brich 111784 WINDHITH THE THE THE Simulide Decapoda BIL Red Ephemeroptera I Gastropoda Bretidie F RH Pelecypoda Fingenail WYM Plecoptera Other Calipteripedae - 1111 T WGL Coercanonida 111 F ,66 Planarian A 16L Trichoptera # a. Hydrophy 3 : ULL Hemiptera

Taxonomic certainty rating (TCR) 1-5:1=most certain, 5=least certain. If rating is 3-5, give reason (e.g., missing gills). LS= life stage: I = immature; P = pupa; A = adult TI = Taxonomists initials

Total No. Organisms

Total No. Taxa

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME RUSK CreeK | | | | LOCATION | LOCATION Harmonie State RICK | | | | | | | | | | | | |
|---|----------------------------|---------------------------------|---|----------------------------|--|---|-----------------------|----------------------------|--------------------------------------|----------------------------|-----------------------|--|-------------|--------------|------|------|----|
| STATION # RIVERMILE | | | | | STREAM CLASS | | | | | | | | | | | | |
| LAT | _ LC | NG | | | | RIVER BAS | RIVER BASIN | | | | | | | | | | |
| STORET# | | | | | AGENCY | | | | | | | | | | | | |
| INVESTIGATORS | 3C | 3 V | VC | <u>-</u> ـ | A | 5 | • | | | L | TO. | NUMBER | | | | | |
| FORM COMPLETED | | | | |) | DATE 10/ TIME 9: | | | PM | R | EAS | ON FOR SURVEY | | | | | |
| HABITAT TYPES | Ø | Cob | ble_ | 10 | % | tage of each habitat Snags_2_% phytes% | | eget | nt ated □ O | Bani ther | ks_ _ | _% \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | <u>**</u> % | | | | |
| SAMPLE COLLECTION | Ho In | ow w dica Cob | vere te th | the ie nu | samp ımbe | nme kick-net les collected? r of jabs/kicks taker Snags phytes | wadin | g h hs eget | ם bita | fron t typ Ban | n ban pe. ks | k | oat | | | | |
| GENERAL COMMENTS | | | | | - | | | | | | | | | | | | |
| QUALITATIVE L Indicate estimated | IST abu | INC | G O | F A | QUA = A | ATIC BIOTA bsent/Not Observ | ed, 1 | = R | are, | 2 = | - Co | mmon, 3= Abunc | lant, 4 | =] | Dom | inar | ıt |
| Periphyton | | | | | 0 | 1 2 3 4 | | Slir | nes | | | | 0 |) 1 | 2 | 3 | 4 |
| Filamentous Algae | | | | | 0 | 1 2 3 4 | | Ma | croi | nver | tebr | ates | 0 | 1 | 2 (| 3 | 4 |
| Macrophytes | | | | | (0) | 1 2 3 4 | | Fis | | | | | 0 | 1 | | 3 | 4 |
| FIELD OBSERVA Indicate estimated | abu | ında | псе | : | 0 = . orga | Absent/Not Obser misms), 3= Abund | lant (> | =] | orga | e (1- anis | 3 or ms), | ganisms), 2 = Co 4 = Dominant (> | 50 org | gan | isms | | |
| l | 0 | 1 | 7 | 3 | 4. | Anisoptera | 0 | 1 | 2 | 3 | 4 | Chironomidae | 0 | 1 | 2 | 3 | 4 |
| Porifera | | | 2 | | 4 | | | 1 | ~ | • | ایر | Darla sans a | ^ | 1 | ~ | | |
| Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygoptera | 0 | 1 | 2 | 3 | 4 | Ephemeroptera Trichontera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes | 0 0 | 1 1 | 2 | 3 | 4 | Zygoptera Hemiptera | 0 0 | 1 | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes Turbellaria | 0 0 0 | 1 1 1 | 2 2 2 | 3 3 3 | 4 4 | Zygoptera Hemiptera Coleoptera | 0 0 0 | 1 | 2 | 3 | 4 | | _ | - | | | |
| Hydrozoa Platyhelminthes Turbellaria Hirudinea | 0 0 0 | 1 1 1 | 2 2 2 2 | 3 3 3 | 4 4 4 | Zygoptera Hemiptera Coleoptera Lepidoptera | 0 0 0 | 1 | 2 2 2 | 3 3 3 | 4 4 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta | 0 0 0 0 | 1 1 1 1 | 2 2 2 2 2 | 3 3 3 3 | 4 4 4 4 | Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae | 0 0 0 0 | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 | 4 4 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda | 0 0 0 | 1 1 1 | 2 2 2 2 | 3 3 3 3 3 | 4 4 4 | Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae | 0 0 0 | 1 1 1 | 2 2 2 2 2 | 3 3 3 3 | 4 4 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda | 0 0 0 0 0 | 1 1 1 1 1 | 2 2 2 2 2 2 | 3 3 3 3 | 4 4 4 4 4 | Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae | 0 0 0 0 | 1 1 1 1 1 | 2 2 2 2 | 3 3 3 3 | 4 4 4 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda | 0 0 0 0 0 | 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 | 4 4 4 4 4 4 | Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae | 0 0 0 0 0 | 1 1 1 1 1 | 2 2 2 2 2 2 | 3 3 3 3 3 | 4 4 4 4 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda | 0 0 0 0 0 0 | 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 | 4 4 4 4 4 4 | Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae Empididae | 0 0 0 0 0 | 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 | 4 4 4 4 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | STREAM NAME RUS | h Creek | LOCATION H | irmonia State Park | • | | |
|--------------|--|---|-----------------------------------|---|------------------------|-----------|-------------------|
| | STATION#R | | STREAM CLAS | | | | |
| | LATLC | ONG | RIVER BASIN | | | | |
| | STORET# | | AGENCY | | | | |
| | INVESTIGATORS & | | | | | | |
| | FORM COMPLETED BY | , | DATE 10/12/0 TIME 9:30 | | | | |
| | | | and 10 | /13/04 at 16:00 | | | • |
| | WEATHER CONDITIONS | Now | | Past 24 Has there been a h hours Yes ANo | eavy rain in the las | t 7 days? | currently drizzli |
| | , | rain (st showers (| | Air Temperature O Other | <u>7</u> °c | | |
| DFLB(A) Dept | SITE LOCATION/MAP | Draw a map of the site | and indicate the | vareas sampled (or attach a ph | otograph) DFLB (ft) | DEPIH | VECT |
| 2.0 0. | .05 | 1.0 | 0.+ 20 | echonb 1 | PELBUIS | | · |
| 4.0 03 | 0.01 | 2.0 | 0.1- | | 1.0 | -1 | 0.29 0.29 |
| > 1 | 0.11 | | | ~~ | 2.0 | 0.2 | 0.31 |
| 6,0 0,4 | | 3.0 | 0. 2 | .08 | 3.0 | 0.2 | 0.12 |
| 8.0 0.5 | 0.19 | 4.0 | 0,2 | .23 | 5.0 | 0.2 | G. 27 |
| 0.0 0.2 | 0.06 | | | 0,24 | 6,0 | 0.2 | 0.31 |
| | | 5.0 | 0.3 | | 7.0 | 0.3 | 0.24 |
| 12.0 0.4 | 0.04 | 6.0 | 0.3 | 0.26 | 8.0 | 0.3 | 0.09 |
| 14.0 0.4 | 0.03 | 7.0 | 0,4 | 6.22 | 9.0* | 0.2 | 0.62 |
| | 0.02 | 8,0 | 0.4 | 0.36 | 10.0 | 0.2 | 0.47 |
| 16.0 0.6 | and the second s | 9.0 | 0.4 | 0.23 | 11.0 | 0.2 | 0.17 |
| 18.0 0.8 | 0.18 | 10.0 | 0.3 | 0.29 | 13.0 | 0,2 | 0.18 |
| 20.0 0.5 | 0.34 | 11.0 | 0.3 | 6.27 | 15.0 | 0.2 | 0.3 |
| 200.2 | | 12,0 | 0.3 | 0.26 | 16.6 | 0,2 | 0,16 |
| | | 13.0 | 0.3 | 0.27 | - | | -0,10 |
| 1 4 - SNI | 12E | 14.0 | 0.2 | 0.23 | 17.0 | 0,2 | 0.56 |
| <u>.</u> | | 15.0 | 02 | 0.10 | 18-B | ANKG | HURE) |
| | | 16.0 | 0,2 | NR 19-5+X8 | 1 | • | |
| | | 17 | 0,1 | 1012 | 1 | | 1 |
| | STREAM CHARACTERIZATION | Stream Subsystem Perennial Inter | ○, { mittent □ Tidal | Stream Type Coldwater | Warmwater | | |
| | | Stream Origin Glacial Non-glacial montane Swamp and bog | Spring-fed Mixture of Other | Catchment Area | km² | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| | | · |
|---|---|--|
| WATERSHED FEATURES | Predominant Surrounding Landuse Forest | Local Watershed NPS Pollution No evidence Some potential sources Obvious sources Local Watershed Erosion None Moderate Heavy |
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and record the dominant species present | I Grasses U Herbaceous |
| INSTREAM FEATURES | Estimated Reach Length 100 m Estimated Stream Width 10 m Sampling Reach Area m² Area in km² (m²x1000) km² Estimated Stream Depth 5 m Surface Velocity m/sec (at thalweg) | Canopy Cover Partly open Partly shaded Shaded High Water Mark m Proportion of Reach Represented by Stream Morphology Types Riffle % Run % Pool % Channelized Pes No Dam Present Per No |
| LARGE WOODY DEBRIS | LWDm² Density of LWDm²/km² (LWD/ read | ch area) |
| AQUATIC VEGETATION | Indicate the dominant type and record the domi Rooted emergent Floating Algae dominant species present Portion of the reach with aquatic vegetation | ☐ Rooted floating ☐ Free floating |
| WATER QUALITY ★ = 10/12/04 □ = 10/13/04 | Temperature 58.29 F 14.6°C Specific Conductance 534.3 \(\text{pm} \) hos \(\text{D} \) Dissolved Oxygen \(\frac{7.85mg}{4.85mg} \) \(\text{D} \) pH \(\frac{7.61}{5.8} \text{ \text{\text{WQ Instrument Used}}} \) OR \(\text{P} = \text{+290} \) | Water Odors Normal/None Sewage Petroleum Chemical Fishy Other Water Surface Oils Slick Sheen Globs Flecks None Other Turbidity (if not measured) Clear Slightly turbid Turbid Opaque Stained Other |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage Petroleum Chemical Anaerobic None Other Ojls Absent Slight Moderate Profuse | Deposits Sludge Sawdust Paper fiber Sand Cher Looking at stones which are not deeply embedded, are the undersides black in color? Sand No |

| INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) | | | | OMPONENTS up to 100%) | | |
|---|----------------------|------------------------------------|-------------------|--------------------------|-----------------------------------|--|
| Substrate Diameter Type | | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | |
| Bedrock | 1 | | | | | |
| Boulder | > 256 mm (10") | 5 | | materials (CPOM) | 5 | |
| Cobble | 64-256 mm (2.5"-10") | 15 | Muck-Mud | black, very fine organic | | |
| Gravel | 2-64 mm (0.1"-2.5") | 30 | | (FPOM) | | |
| Sand | 0.06-2mm (gritty) | 35 | Marl | grey, shell fragments | | |
| Silt | 0.004-0.06 mm | 10 | 1 | | J | |
| Clay | < 0.004 mm (slick) | 5 | 1 | | , | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| III XIII XIII XIII XIII XIII XIII XIII | |
|--|---------------------------------|
| STREAM NAME RUSH Creek | LOCATION Harmonie State Park |
| STATION # RIVERMILE | STREAM CLASS |
| LAT LONG | RIVER BASIN |
| STORET# | AGENCY |
| INVESTIGATORS EDB, WG-L | |
| FORM COMPLETED BY | DATE 10/12/04 REASON FOR SURVEY |
| | |

| | Habitat | | Condition | Category | |
|--|---|---|---|---|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| ach. | SCORE B | 20 pg 19"218 1947. 145 | | 0.00 | |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ted in | SCORE | 30 80 976 81 20 816 | okajakaiskija si | | |
| be evalua | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ers f | SCORE 1 | 2019:19 . 18 417. 118 | | | |
| Paramet | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | SCORE 10 | 20 1/19 188 17 16 | 73 Ma - 10 P2 MI | | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | |
| | SCORE 10 | 2019 19 10 18 117 196 | 259214 (23) 12 (11) | 101900128400/038 | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat Parameter | | Condition | Category | |
|--|--|--|--|---|---|
| L | Larameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration Channelization or dredging absent or minimal; stream with normal pattern. | | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| | SCORE 18 | 20 2 492 18 312 - 16 | ाई, तम् । शहरहार ११: | 10 9 8 7 7 6 | 35 (45 E 7786) L. C |
| pling reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note-channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| Sam | score /8 | 20, 919 (18, 997 316, | 15 (14 1914) 12 (11) | 10 9 8 47 5 6 . | \$3.4950, \$54.50 |
| Parameters to be evaluated broader than sampling reach | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| be evalus | SCORE 3 (LB) SCORE 3 (RB) | Teff Bank 10 9 2 Right Bank 10 9 | 8 7 6 6 38 7 7 6 6 | | |
| Parameters to | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE $\frac{1}{3}$ (LB) | Left Bank 10, 9 Right Bank 310, 9 | 8 47 2 6 v 8 vi 2 6 v | 5 4 33 3 5 4 4 6 6 | 2.00 |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE (LB) SCORE (RB) | Left Bank 10 9 . Right Bank 10 9 | 8 7 6 | 5 2 4 7 3 % | 2 (1) (1) (1) |

Total Score 103

| | | _ |
|--|--|---|
| | | A |
| | | |

Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

| | | | 1 |
|---|----------|---|---|
| | | 1 | 5 |
| ٠ | <u> </u> | _ | 9 |

| | RM: Stream: | Rush Creek | | ·· · |
|--|--|------------------------------------|---------------------------|-----------------|
| River Code: | | | ate Park | |
| Date: 10/12/04 | Location: Station | | 2/2 147 | |
| Scorers Full Name: E | Belmonte Affiliation | | | |
| | NLY Two SubstrateTYPE BOXE | :5; Estimate % present | SUBSTRATE QUALITY | |
| TYPE POOL F | | FFLE SUBSTRATE ORIGIN | Check ONE (OR 2 & AVERAGE | ' |
| ☐ ☐-BLDR /SLBS[10] | | Check ONE (OR 2 & AVERAGE) | • | •1 |
| □ □-BOULDER [9] | | O -LIMESTONE [1] SILT: | SILT HEAVY [-2] | Substrate |
| | BEDROCK[5] | | SILT MODERATE [-1] | |
| ☐ | DETRITUS[3] | □ -WETLANDS[0] | | 16 |
| □ □ -MUCK [2] | NOTE: Ignore Studge Originating | - HARDPAN [0] | | |
| □ □ SILT [2] | From Point Sources | -SANDSTONE [0] EMBEDD | | Max 20 |
| | | I -RIP/RAP [0] NESS: | -MODERATE [-1] | |
| NUMBER OF SUBSTRATE TY | | -LACUSTRINE [0] | -NORMAL [0] | |
| (High Quality Only, Score 5 o | or >) | -SHALE [-1] | ☐-NONE [1] | |
| COMMENTS | | D-COAL FINES [-2] | | · · · |
| • | ive each cover type a score of | 0 to 3; see back for instructions) | AMOUNT: (Check ONLY One | or Cover |
| (Structure) | TYPE: Score All That Oc | | check 2 and AVERAGE) | |
| UNDERGUT BANKS [1] | POOLS> 70 cm [2] | | - EXTENSIVE > 75% [11] | 11511 |
| OVERHANGING VEGETATION | | AQUATIC MACROPHYTES [1] | MODERATE 25-75% [7] | ريسي |
| SHALLOWS (IN SLOW WAT | | LOGS OR WOODY DEBRIS [1] | ☐ - SPARSE 5-25% [3] | Max 20 |
| ROOTMATS [1] COMM | | | - NEARLY ABSENT < 5%[1] | |
| 3] CHANNEL MORPHOLO | • | Category OR check 2 and AVERAG | | Channel |
| | OPMENT CHANNELIZATION | | TIONS/OTHER | Chaine |
| | XCELLENT [7] D - NONE [6] | HIGH [3] - SNAG | | ,2 |
| | OOD [5] - RECOVERED | | | |
| | AIR [3] RECOVERING | .[-1 | PY REMOVAL - LEVEED | Max 20 |
| ■ - NONE [1] ■ - P | OOR [1] II - RECENT OR | | | |
| | RECOVERY [1] | □ - ONE S | IDE CHANNEL MODIFICATIONS | |
| COMMENTS: | | | 0 | |
| - | | per bank or check 2 and AVERAGE pe | | Downstream # |
| RIPARIAN WIDTH | | QUALITY (PAST 100 Meter RIPARIA | | Riparian |
| L R (Per Bank) | L R (Most Predominant Per I | • | L R (Per Bank) | |
| " □ □ - WIDE > 50m [4] | FOREST, SWAMP [3] | CONSERVATION TILLAC | | 1 6 |
| MODERATE 10-50m [3] | | URBAN OR INDUSTRIA | | 1-Max 10 |
| □ - NARROW 5-10 m [2] | | IELD [1] III OPEN PASTURE, ROW(| - | 1] |
| |] 🔲 🗇 -FENCED PASTURE [1] | □ □-MINING/CONSTRUCT | ON [0] | |
| ■ - NONE [0] | | | | |
| COMMENTS: | | | | |
| | | | | |
| 5.]POOL/GLIDE AND RIFF | | CURRENT VELOCI | TV + DOOL 6 & DIFF! F6!! | Pool/ |
| MAX. DEPTH | MORPHOLOGY | \ | TY [POOLS & RIFFLES!] | Current |
| (Check 1 ONLY!) | (Check 1 or 2 & AVERAGE | • | II That Apply) | |
| | POOL WIDTH > RIFFLE WIDTH | | I -TORRENTIAL[-1] | [6] |
| | POOL WIDTH - RIFFLE WIDTH | | I-INTERSTITIAL[-1] | Max 12 |
| | D-POOL WIDTH < RIFFLE W. [0] | | I-INTERMITTENT[-2] | |
| □ - 0.2-0.4m [1] | | Z -SLOW [1] | -VERY FAST[1] | |
| - < 0.2m [POOL=0] | COMMENTS: | | | |
| | 0.17014.01 | UE OD OUEOU O AND AVEDAGE | • | Riffle/Run |
| | | NE OR CHECK 2 AND AVERAGE | DIECLE (DIAL EMBEDDEDMECC | |
| RIFFLE DEPTH | RUN DEPTH | | RIFFLE/RUN EMBEDDEDNESS | |
| ☐ - Best Areas >10 cm [2] | | STABLE (e.g., Cobble, Boulder) [2] | | Max 8 |
| Best Areas 5-10 cm[1] | | MOD. STABLE (e.g., Large Gravel) | | |
| Best Areas < 5 cm | D | UNSTABLE (Fine Gravel, Sand) [0] | - MODERATE [0] | Gradient |
| [RIFFLE=0] | | <u> </u> | - EXTENSIVE [-1] | |
| COMMENTS: | | NO RIFFLI | E [Metnc=u] | |
| | | 97 %5001-5 | SOL WOUNE | Max 10 |
| 6] GRADIENT (ft/mi): | DRAINAGE AREA (sq.m | ii.) : 9.2 %POOL: [_ | 20 %GLIDE: | |
| <u> </u> | | | 10 %RUN: 20 | |
| ** Best areas must be large enough to supp | sort a population of mire-doligate species | | | 00/04/04 |

Vial#

| Macrobenthos | Qualitative | Sample | LIST |
|--------------|-------------|--------|------|
|--------------|-------------|--------|------|

| 21 [| | | | | | | | |
|---|---|--|--|--|------------------------|--|--|--|
| 1 | ORDER | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | | 5 |
| | Nematomorpha | | | | | | | Parasite |
| 23 | Hydracarina- Trombidiformes | | | | | | 0.000 | Predators/Paras |
| | Tubellaria | Planaria | | | | 4 | 0.000 | Omnivore |
| - 17 | Porifera | Spongillidae | | | | | 0.000 | Filters |
| | | | 0-+: | D | + | 0.0 | | |
| 31 | Pelecypoda | Corbiculidae | Corbicula | fluminea | | 3.2 | 0.000 | |
| - 1 | | Dreissenidae | Dreissena | polymorpha | | | 0.000 | Filters |
| - 1 | | Unionidae | Villosa | iris | | | 0.000 | Filters |
| 18 | | | 7,11000 | 1 | - | 8 | 0.480 | |
| | | Sphaeriidae | | | 6 | | | |
| | Gastropoda | Ancylidae | | | | 6 | | Scrapers |
| 20 | | Lymnaeidae | | | 1 1 | 6.9 | 0.069 | Scrapers |
| | · · · · · · · · · · · · · · · · · · · | Lymnaeidae | Fossaria | | | . 6 | | Scrapers |
| | | | i Ossaila | | + | | | |
| 19 | | Physidae | l | L | | 8 | 0.000 | Scrapers |
| - [| | Physidae | Physelia | | | 8 | 0.000 | Scrapers |
| r | | Planorbidae | T . | | | 7 | 0.000 | Scrapers |
| ŀ | | | Dlamadaula | 1 | _ | 7 | | |
| - 1 | | Planorbidae | Planorbula | | + | | 0.000 | Scrapers |
| L | | Pleuroceridae | | | | | 0.000 | Scrapers |
| Г | | Bithyniidae | Bithynia | tentaculata | | i | 0.000 | Scrapers |
| 11 | Annelida | Hirudinea | i ' | | 1 1 | 10 | | Gathers |
| 25 | , unional | | | t e | | | | Gathers |
| | | Oligochaeta | | | | _ | | |
| | Decapoda | 1 | | | | В | | Predators |
| 17 | Amphipoda | 1 | l | ł | 3 | 4 | 0.120 | Shredders |
| 24 | Isopoda | Asellidae | | | 2 | 8 | | Shredders |
| | | 110011010 | | | | | | |
| | Ostracoda | | | | | 8 | 0.000 | Scavengers |
| - U | Ephemeroptera | Caenidae | | | | 7 | 0.000 | Gathers |
| 13[| | Caenidae | Caenis | | | 3.1 | 0.000 | Gathers |
| ı | | Ephemeridae | Hexagenia | 1 | | 3.6 | | Gathers |
| ۱., | | | | | 10 | | | |
| 15 | | Baetidae | Baetis | l | 12 | 3.1 | | Gathers |
| - 1 | | Baetidae | Baetis | brunneicolor | | 4 | | Gathers |
| ٦ | | Baetidae | Baetis | intercalaris | 1 | 2.7 | 0.000 | Gathers |
| ١ | | Baetidae | Callibaetis | | | 5.6 | | Gathers |
| ı٠ | - | Liantananiida - | | | + | | 0.000 | C |
| 14 | | Heptageniidae | Stenacron | 1 | + | 3.1 | | Scrapers |
| -1 | L | Heptageniidae | Stenacron | gildersleevei | | 3.1 | 0.000 | Scrapers |
| ı | - | Heptageniidae | Stenonema | 1 | | 4 | | Scrapers |
| - F | | | Stenonema | exicuum | | 1.9 | | |
| ŀ | | Heptageniidae | | exiguum | + | | 0.000 | Scrapers |
| L | | Isonychiidae | Isonychia | | | 2 | | Filters |
| ſ | | Leptohyphidae | Tricorythodes | 1 | | 2.7 | | Gathers |
| ı | | Siphionuridae | T | 1 | 1 | 7 | | Gathers |
| H | | | Timponogo | | + | | | |
| 1 | | Ephemerellidae | Timpanoga | | | 1 | | Gathers |
| - 1 | | Leptophlebiidae | | | | 2 | 0.000 | Gathers |
| ,91 | Coleoptera | Dytiscidae | | | | 5 | | Predators |
| 37 | | Gyrinidae | | | 1 | 5 | | Predators |
| F | | | Dinastra | | + | | | |
| | | Gyrinidae | Dineutus | | | 3.7 | 0.000 | Predators |
| 33[| | Haliplidae | | | | 7 | 0.000 | Predators |
| Γ | | Dryopidae | | | | 5 | 0.000 | Predators |
| 32 | | Elmidae | | | | 4 | | Gathers |
| ۳ŀ | | | h | | | | | |
| L | | Psephenidae | Psephenus | | | 4 | | Scrapers |
| L | | Hydrophiloidae | | | | I | 0.000 | Gathers |
| 7 | | Hydrophiloidae | Tropisternus | | | | 0.000 | Gathers |
| Ť | Megaloptera | Sialidae | | | 1 | 4 | | Predators |
| ŀ | megaoptera | | 0 | - | + | | 0.000 | r redaiors |
| - 1 | | Corydalidae | Corydaius | | | 4 | | Predators |
| L | Trichoptera | Brachycentridae | Brachycentrus | 1 | _1 | 1 | 0.000 | Filters |
| - [| | Helicopsychidae | Helicopsyche | | T | 3 | 0.000 | Scrapers |
| - 1 | | Helicopsychidae | Helicopsyche | borealis | 1 | 3 | 0.000 | Scrapers |
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| 34 3 3 4 6 5 30 11 12 35 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Leptoceridae Molannidae Phispotamidae Phispotamidae Phispotamidae Physpaneidae Polycantiopodidae Psychomyldiae Belostomatidae Belostomatidae Belostomatidae Gerridae Gerridae Gerridae Gerridae Response | Hagenella Cyrnellus Lype Belostoma Trepobates Notonects Ranatra Perlesta Naopería Boyeria Caloptery: Argis | | 3 8 1 | 4 6 6 3 3 4 4 6 6 2 2 1 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Shredders Shredders Gathers Filters Shredders Filters Shredders Filters Gathers Fredators Fredat |
| 34 3 3 4 5 5 30 11 12 35 10 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Leptoceridae Molannidae Philopotamidae Philopotamidae Philopotamidae Philopotamidae Pholopotamidae Pobeantropodidae Poseantropodidae Peschormydidae Belostornatidae Belostornatidae Belostornatidae Gerridae Gerridae Gerridae Notonectidae Notonectidae Nopidae Peridae Peridae Cerides Cerides Condedidae Condedidae Condedidae Condedidae Condedidae Condedidae Condedidae Condedidae Calopterydidae Calopterydidae Calopterydidae Coenagriomidae Coenagriomidae Coenagriomidae Lestidae Ceridoponidae Blood-red Chironomidae Other Chironomidae Culicidae Simulidae | Hagenella Cyrnellus Lype Belostoma Trepobates Notonects Ranatra Perlesta Naopería Boyeria Caloptery: Argis | | 3 3 8 1 33 | 4 6 6 3 3 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 | 0.0000 0.000 | Shredders Shredders Gathers Gathers Filters Shredders Filters Shredders Filters Shredders Filters Gathers Fredators Predators Fredators |
| 34 3 4 5 5 30 11 12 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Leptoceridae Molannidae Phispotamidae Phispotamidae Phispotamidae Physpaneidae Pohycanitopodidae Psychomykidae Belostomatidae Belostomatidae Belostomatidae Gerridae Gerridae Gerridae Gerridae Notonecitidae Nopidae Perikidae Nopidae Perikidae Chloroperidae Aeshnidae Gomphidae Cordulegastridae Cordulegastridae Cordulidae Lbellulidae Calopterypidae Calopterypidae Calopterypidae Cenagronidae Cenagronidae Cenagronidae Lestidae Ceratiopogonidae Lestidae Ceratiopogonidae Lestidae Ceratiopogonidae Ceratiopogonidae Simulidae | Hagenella Cyrnellus Lype Belostoma Trepobates Notonects Ranatra Perlesta Naopería Boyeria Caloptery: Argis | | 3 8 1 | 4 6 6 3 4 4 6 6 2 2 1 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | 0.000 | Shredders Shredders Gathers Filters Shredders Filters Shredders Filters Gathers Fredators Predators Fredators |
| 34 3 3 4 6 5 30 11 12 35 10 | Plecoptera Odonata-Anisoptera Odonata-Zygoptera | Leptoceridae Molannidae Philopotamidae Philopotamidae Philopotamidae Philopotamidae Pholopotamidae Pobeantropodidae Poseantropodidae Peschormydidae Belostornatidae Belostornatidae Belostornatidae Gerridae Gerridae Gerridae Notonectidae Notonectidae Nopidae Peridae Peridae Cerides Cerides Condedidae Condedidae Condedidae Condedidae Condedidae Condedidae Condedidae Condedidae Calopterydidae Calopterydidae Calopterydidae Coenagriomidae Coenagriomidae Coenagriomidae Lestidae Ceridoponidae Blood-red Chironomidae Other Chironomidae Culicidae Simulidae | Hagenella Cyrnellus Lype Belostoma Trepobates Notonects Ranatra Perlesta Naopería Boyeria Caloptery: Argis | | 3 3 8 1 33 | 4 6 6 3 3 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 | 0.000 | Shradders Shradders Shradders Gathers Filters Shradders Filters Shradders Filters Shradders Filters Predators Shradders Gathers Gathers Gathers Gathers Gathers Gathers Gathers Gathers Gathers Filters Filters |

| TAXA RICHNESS | 14 |
|---------------------------------|-------|
| FBI | 5.308 |
| Scraper/Filter | 0.019 |
| EPT/Chironomidae | 2.273 |
| % Contribution of Dominant Taxa | 0.330 |
| EPT Index | 2.000 |
| Community Similarity Indices | 0.000 |
| | 1.000 |
| CPOM | 0.060 |
| Total Number Collected | 100 |

Comm. Loss = 0 Jaccard Coef. = 1

| STREAM NAME BAFF (| iceK | | | | LOCATION C | ounty Line | Rd | | | |
|----------------------|----------|---------|---------|-------------|---------------------|----------------|---------|--------|-------|-----|
| STATION# 2 | RIV | ERMII | LE | | STREAM CLASS | | | | | |
| LATLONG | | | | RIVER BASIN | | | | | | |
| STORET# | | | | AGENCY | AGENCY | | | | | |
| COLLECTED BY EDB, WE | ARS | DAT | TE 10 / | 13/04 | LOT# | | | | | |
| TAXONOMIST EDB W | 5-L | DA7 | re | | SUBSAMPLE TA | RGET 🗆 100 🗅 2 | 200 🗆 : | 300 🗅 | Other | |
| | nter Fam | ily and | l/or G | enus an | d Species name on b | lank line. | | ****** | | |
| Organisms | · No. | LS | TI | TCR | Organ | isms | No. | LS | TI | TCR |
| Oligochaeta MA | WW | | | | Megaloptera | | | | | |
| | 120 | _ | 1 | | | | T | | | T |

| 0 | rganisms | • | No. | LS | TI | TCR | 0 | rganisms | No. | LS | TI | TCR | |
|---------------|-----------|----------|----------|----------|----------|------|----------------|---------------------------|--------|-----|------------|-----------------|-------------------|
| Oligochaeta | JAN LATUR | 1414 | W | 1 | | | Megaloptera | | | | | | |
| | | (2) | 30 | A | WEL | | 1 | | | | | | |
| Iirudinea , | - | | | | | • | Colcoptera | WWH (8) | 10 | A | ررر | - | - Omde |
| | | | | | | • | Larvie | 1 (1) | X | T | 16L | , | - Halipi |
| sopoda | , | | | | | - | Hydrighterage | 1 - 41 0/00 | 4 | × A | ille | 1 | |
| | | | | | | | 1 | 4 | | | 7.70 | | (1) |
| Amphipoda . | 1 | ② | 4 | ٨ | ca | | Diptera W Red | 111 (3) | 2 | I | WL | (| |
| | | | | | | | larvae | | | | | | |
| Decapoda | | | | | | • | culicipt | 10 (2) | × | Ĺ- | WEL | (| - |
| | | | <u> </u> | | <u> </u> | | | | | | | | |
| Sphemeroptera | Man | | <u> </u> | | | e Jr | 143. | | | | | | |
| Boetid | 1111 | <u> </u> | N | 三 | u | , • | Gastropoda LH | MANUELO | ٧ | 1 | w6L | | |
| | | | | _ | | | | 7 physi lac | | | | | |
| | | | | <u> </u> | | | - LUTA | . ((2)) | _ | | | | |
| 1 | | | | | _ | • | Pelecypoda Asa | MILLIAN D | A | A | ULL | | |
| Plecoptera | | | | | | - | | | | | | | |
| | | | | | | | a Coercanonida | HH HIT HIT WILL | LPT 11 | | | | |
| | | | | | | | Odorda | IMI E | | _ | | | |
| | | | | | | | an | 4111 | 18 | F | WEL | | |
| richoptera | | | | | | | 5 | 1-7 | \$ 3 | | | | |
| _ | | | | | | | | coen convidue | 18 | Ŧ | , , , | - -} | (|
| | | | | | | | | GEn gallgra | 14 | 7 + | 661 662 | - | (<u>)</u> (9) |
| | | | | | | | | 3 2 7 7 7 7 7 | | | 1762 | | <u>پ</u> |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Iemiptera | | | | | | | İ | | | | | | |
| noder ströer | l | 0 | X | A | wel | 1 | | | | . 4 | | \neg | |
| voterbookman | 1 | 0 | X | 4 | wel | , | · | 5, give reason (e.g., mis | | | | | - |

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME | 251 | ` | 4 | <u>œ</u> | < | LOCA | TION | Cé | un | 4 | 7 | 12 | Rd | | | • | | |
|-------------------------------------|----------|--|------|----------|---------------|---------------------------------------|----------|-------------|------|------------|-------------|-------|---|------------|-------|-----|-----|-----|
| STATION# | | | RMI | | | STRE | AM CL | | | | | | | | | | | |
| LAT | LC | DNG | | | | RIVE | RBASI | N | | | | | | | | | | |
| STORET# | | | | | | AGEN | CY | | | | | | | | | | | |
| INVESTIGATORS 2 | <u> </u> | B | , u | 16 | ۲, | AR3 | | | | | I | TO | NUMBER | | | | | |
| FORM COMPLETED | BY | | E. | 71 | > | DATE TIME | 13: | 3/00 | AM | PM | F | REA! | SON FOR SURVEY | | | | | |
| HABITAT TYPES | | Cob | ble_ | <u>5</u> | % | tage of each his | abitat t | ype pi | eget | nt ated | Ban ther | ks | <u>O</u> % | <u>ෆ</u> % | | | | |
| SAMPLE COLLECTION | | | | | | ame □ kick-n | | | | ther _ | | n bar | nk 🔾 from bo | - at | | | | |
| | | Indicate the number of labs/kicks taken in each habitat type. Cobble 10 Snags 10 Vegetated Banks 10 Sand 10 Submerged Macrophytes 0 Other () | | | | | | | | | | | | | | | | |
| GENERAL COMMENTS | | | | | | | | | | | | | | | | | | |
| | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | |
| QUALITATIVE L Indicate estimated | | | | | | | | d, 1 = | = R | are, | 2 = | - Co | mmon, 3= Abund | ant, 4 | 4 =] | Dom | ina | nt |
| Periphyton | • | | | | 0 | 1 2 3 | 4 | | Slir | nes | | | | 10 | 1 | 2 | 3 | 4 |
| Filamentous Algae | | | | | 0 | 1 2 3 | 4 | | Ma | croii | nver | tebr | ates | 0 | 1 | (2) | 3 | 4 |
| Macrophytes | | | | | 0 | $\overbrace{1}$ 2 3 | 4 | | Fisl | 1 | | | | 0 | _1_ | 2 | 3 | 4 |
| FIELD OBSERVA Indicate estimated | | | | : | 0 = . orga | Absent/Not C inisms), 3= A | bserv | | | | | | Yellow Bull hea ganisms), 2 = Con 4 = Dominant (> | - nmon | | |) | |
| Porif er a | 0 | 1 | 2 | 3. | 4 | *Anisoptera | | 0 | 1 | 2 | 3 | 4 | | 0 | 1 | 2 - | 3 | 4 |
| Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygoptera | | 0 | 1 | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes | 0 | 1 | 2 | 3 | 4 | Hemiptera | | 0 | 1 | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Turbellaria | 0 | 1 | 2 | 3 | 4 | Coleoptera | | 0 | 1 | 2 | 3 | 4 | Other | 0 | 1 | 2 | 3 | 4 |
| Hirudinea | 0 | 1 | 2 | 3 | 4 | Lepidoptera | | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Oligochaeta | 0 | 1 | 2 | 3 | 4 | Sialidae | | 0 | 1 | 2 | 3 | 4 | • | | | | | |
| Isopoda | 0 | 1 | 2 | 3 | 4 | Corydalidae | | 0 | 1 | 2 | 3 | 4 | | | | | | . [|
| Amphipoda | 0 | 1 | 2 | 3 | 4 | Tipulidae | | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Decapoda Gastropoda | 0 | 1 | 2 | 3 | 4 | Empididae | | 0 | 1 | 2 | 3 | 4 | | | | | | |
| | Λ | 1 | • | ~ | | Cimeral!! 1- | | ^ | 1 | ^ | ~ | | | | | | | |
| - | 0 | 1 | 2 | 3 | 4 | Simuliidae | | 0 | 1 | 2 | 3 | 4 | : | | | | | |
| Bivalvia | 0 | 1 | 2 | 3 | 4 | Simuliidae Tabinidae Culcidae | | 0 0 0 | 1 1 | 2 2 2 | 3 3 | 4 4 | | | | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| STREAM NAME BALL Creek | LOCATION County Line Rd |
|------------------------|-------------------------------|
| STATION # 2 RIVERMILE | STREAM CLASS |
| LATLONG | RIVER BASIN |
| STORET # | AGENCY |
| INVESTIGATORS EDB, WGL | |
| FORM COMPLETED BY | DATE 10/13/04 TIME 13:30 AM M |
| EJB | TIME 18:30 AM PM |

| | | WEATHER CONDITIONS | Now C s | storm (heavy rain) rain (steady rain) howers (intermittent) %cloud cover clear/sunny | Past 24 hours | Has there been a here Yes © No Air Temperature | - | st 7 days? | |
|-------------------|------------|----------------------------|--|--|------------------|--|------------|------------|---------|
| DFLR | D. G.X | SITE LOCATION/MAP | Draw a map of DFムB (| | the areas sai | pled (or attach a pho DFLB (44) | tograph) | Veloci | 42 (2/2 |
| .5 | 0.5 | Velocity (a/sc) | 10 | 0.3 | 0.07 | 1.0 | 0.8 | 0.05 | |
| 1.0 | 0.6 | 0.03 | 3.0 | 0.6 | 0.05 | 3.0 4.0 | 1.0 | 0.07 | |
| 2.5 | 0.6 | 0,03 | 4.0 | 0.7 | 0.04 | 5.0 | 1.0 | 0.04 | • |
| 3.0 | 0.6 | 0.06 | 5.00 | ં. 9 | 0.04 | 6.0 7.0 | 1-1 1-1 | 6.03 | |
| 4.0 | 0.7 | 0.05 | 7.0 | 1.0 | 0.06 | 8.0 | 1.1 | 0.07 | • |
| 4.5 5.0 | 0.7 | 0.04 0.05 | 9.0 | 1.0 | 0.07 | 9.0 | 1.3 | 0.07 | |
| 5,0 5,5 6.0 | 0.6 0.6 | ୦ . ୦୫ ୦.୦୫ | 10.0 | 1.0 | 0.05 | 12.0 | 1.1 | 0.05 | |
| 6.5 | 0.6 | 0.08 | 12.0 | 1.1 | 010 | 13,0 | 0.9 | 0.05 | |
| 7.0 7.5 | 0.7 | 0.09 | 13.0 | 1.0 | 0.11 | 15.0 | 0.7 | 0.07 | |
| 8.0 | 0.8 | | 14.0 | 0.9 0.9 | 0.04 | 16.0 | RB | | • . |
| 8.5 9.0 | 0.5 | 0.08 | 16.0 | 0.5 | 0.03 | | | | |
| 9.5 | 0.5 RB | · | 16.5 | RB | | | | | |
| , 0,0 | | | | | | | | • | |
| | | STREAM CHARACTERIZATION | Stream Subsys Derennial | tem | ial | Stream Type Coldwater | armwater | | |
| | | | Stream Origin Glacial Non-glacial r Swamp and b | | ed of origins | Catchment Area | km² | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSHED FEATURES | Predominant Surrounding Land Forest Commerc Field/Pasture Industrial Agricultural Other Residential | cial UNo evidence U Some potential sources |
|---|---|---|
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and to Trees Indicate the dominant type and the dominant species present | record the dominant species present ubs Grasses Herbaceous and Canary Grass |
| INSTREAM FEATURES | Estimated Stream Width Sampling Reach Area Area in km² (m²x1000) Estimated Stream Depth | Canopy Cover Partly open Partly shaded Shaded High Water Mark m Proportion of Reach Represented by Stream Morphology Types Riffle 2 % Run 2 % Prool 96 % Channelized Yes No Dam Present Q Yes No |
| LARGE WOODY DEBRIS | LWD 2 m² Density of LWDm² | ² /km² (LWD/ reach area) |
| AQUATIC VEGETATION | Rooted emergent Rooted Floating Algae | record the dominant species present oted submergent Rooted floating Free floating tached Algae flamentous Algae tic vegetation 0% |
| WATER QUALITY | Temperature 59.8° & F Specific Conductance 815.6 Dissolved Oxygen 8.65 pH 7.54 Turbidity 14 WQ Instrument Used Troll 96 | Water Odors Normal/None |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage | Deposits Sudge Sawdust Paper fiber Sand Relict shells Other Looking at stones which are not deeply embedded, are the undersides black in color? |
| INORGANIC SUI | BSTRATE COMPONENTS | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) |

| INC | INORGANIC SUBSTRATE COMPONENTS (should add up to 100%) | | | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | | | | |
|-------------------|---|------------------------------------|-------------------|--|-----------------------------------|--|--|--|--|
| Substrate Type | Diameter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | | | |
| Bedrock | | | Detritus | sticks, wood, coarse plant | | | | | |
| Boulder | > 256 mm (10") | | | materials (CPOM) | 3 | | | | |
| Cobble | 64-256 mm (2.5"-10") | 5 | Muck-Mud | black, very fine organic | | | | | |
| Gravel | 2-64 mm (0.1"-2.5") | 10 | } | (FPOM) | | | | | |
| Sand | 0.06-2mm (gritty) | 20 | Marl | grey, shell fragments | | | | | |
| Silt | 0.004-0.06 mm | 45 | | | | | | | |
| Clay | < 0.004 mm (slick) | 20 | 1 | | | | | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME BOT Creek | LOCATION COUNTY Line Rd |
|-----------------------------|---------------------------------|
| STATION # 2 RIVERMILE | STREAM CLASS |
| LAT LONG | RIVER BASIN |
| STORET# | AGENCY |
| INVESTIGATORS E>B, WGL, ARS | |
| FORM COMPLETED BY | DATE 10/13/04 REASON FOR SURVEY |
| | |

| 7 | Habitat | | Condition | Category | |
|--|---|---|---|--|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| ra ch | score 3 | 2010 018-17-16 | S 14 013 10 11 18 | | |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ited i | score (| 51018403 Section 1216 | | 10-001 | |
| be evalua | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ters to | SCORE 1 | 20,600,200,300,500 | | | |
| Paramet | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | SCORE \ | 20 19 18 17 16 | \$1.4-7. 92.91 | 11 -0 -3 - 7 - 36 | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | |
| | SCORE \\ | 2017 19:5:18 5:17:-20 | 16/14/21#30E/16 | 10 38 28 28 36 46 246 | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | _Habitat | | Condition | Category | |
|--|--|--|--|---|---|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reac channelized and disrupted. Instream habitat greatly altered of removed entirely. |
| | score 6 | 20 4 (19 - 18 - 17 - 16 | 15 (14 (48) 12 11: | 20 - 2 - 8 - 7 - 6 - | S. A. A. B. W. |
| ming reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| Jume | score 3 | 20, 49, 18, 17, 46 | . 15. 14. 131 F2 11. | 10 9% 8 %TEE & | 5,4(5)/200 |
| statistics in the evaluated broads than sampling reads | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughin, 60-100% of bank has erosional sease |
| | SCORE / (LB) SCORE / (RB) | Left Bank 10 9 Right Banks 10 9 | 8 2 7 6 | 5 - Angles | 7.03 Sept. |
| | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambar vegetation is very high vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE 3 (LB) | Left Bank 3 10 10 | 18, 5, 27, 2, 6, 5, | \$35 \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | 2 |
| | SCORE 3 (RB) | (Right Blank = 16 9. | 8 4 7 5 6 | | 2003/09/05 |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE 1 (LB) | Left Barik 10 = 10 = 9 | 8 4 7 2 6 | \$5.50 and \$1.000 and | |
| | SCORE 1 (RB) | Right Bank 10 9- | 8, 7, 12.6 | 40, 40, | 524708,20 |

Total Score _ 51

EPA 4520

06/24/01

| River Code: RM: Stream: Barr Creek | Da | |
|--|--|----------|
| Date: 10/13/04 Location: Station 2, County Line | RO | |
| Scorers Full Name: Ed Belmonte Affiliation: V3 | | |
| 1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present | | |
| TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN | SUBSTRATE QUALITY | |
| GRAVEL [7] O 30 Check ONE (OR 2 & AVERAGE) | Check ONE (OR 2 & AVERAGE) | |
| DID-BOULDER [9] DID-SAND [6] DI-LIMESTONE [1] SILT: | - SILT HEAVY [-2] | |
| DE-COBBLE [8] D-BEDROCK[5] F-TILLS [1] | -SILT MODERATE [-1] Substrat | te |
| DE-HARDPAN [4] DE-DETRITUS[3] DE-WETLANDS[0] | -SILT NORMAL [0] | |
| D-MUCK [2] D-ARTIFICIAL[0] D-HARDPAN [0] | SILT FREE [1] O | |
| PE-SILT [2] 90 10 NOTE: Ignore Sludge Originating Grand-SANDSTONE [0] EMBED | | Ó |
| | -MODERATE [-1] | |
| NUMBER OF SUBSTRATE TYPES: 4 or More [2] -LACUSTRINE [0] | □ -NORMAL [0] | |
| (High Quality Only, Score 5 or >) | -NONE [1] | |
| COMMENTS P-COAL FINES [-2] | | |
| 2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) | AMOUNT: (Check ONLY One or Cover | |
| (Structure) TYPE: Score All That Occur | check 2 and AVERAGE) | , |
| UNDERCUT BANKS [1]POOLS> 70 cm [2]OXBOWS, BACKWATERS [1] | □ - EXTENSIVE > 75% [11] | |
| OVERHANGING VEGETATION [1]ROOTWADS [1]AQUATIC MACROPHYTES [1 |] | J |
| SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1] | - / |) |
| ROOTMATS [1] COMMENTS: | - NEARLY ABSENT < 5%[1] | |
| 3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERA | | |
| | CATIONS/OTHER Channe | 1 |
| □ · HIGH [4] □ · EXCELLENT [7] □ · NONE [6] □ · HIGH [3] □ · SNA | | |
| ☐ - MODERATE [3] ☐ - GOOD [5] ☐ - RECOVERED [4] ☐ - MODERATE [2] ☐ - REL | OCATION 🗖 - ISLANDS | |
| | OPY REMOVAL - LEVEED Max 20 |) |
| D-NONE [1] POOR [1] D-RECENT OR NO D-DRE | | |
| RECOVERY [1] - ONE | E SIDE CHANNEL MODIFICATIONS | |
| COMMENTS: | | |
| | | |
| 4]. RIPARIAN ZONE AND BANK EROSION check ONE box per bank or check 2 and AVERAGE | | am f |
| 4]. RIPARIAN ZONE AND BANK EROSION check ONE box per bank or check 2 and AVERAGE RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPAR) | MAN BANK FROSION | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R | | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) D FOREST, SWAMP [3] D CONSERVATION TILL | AAN) BANK EROSION L R (Per Bank) AGE [1] □□-NONE/LITTLE [3] | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] RIAL [0] -MODERATE [2] | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] RIAL [0] -MODERATE [2] | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] WAL [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] WAL [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] WAL [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] WAL [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 TION [0] | |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION Riparian R (Per Bank) AGE [1] -NONE/LITTLE [3] -NONE/LITTLE [3] WCROP [0] -MODERATE [2] HEAVY/SEVERE[1] Max 10 TION [0] CITY [POOLS & RIFFLES!] Pool/Current | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) D - URBAN OR INDUSTR D - URBAN OR INDUSTR D - WIBLE PER PER PER PER PER PER PER PER PER PE | BANK EROSION L R (Per Bank) AGE [1] -NONE/LITTLE [3] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 TION [0] | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION Riparian R (Per Bank) AGE [1] -NONE/LITTLE [3] -NONE/LITTLE [3] WCROP [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 CITY [POOLS & RIFFLES!] Current All That Apply) -TORRENTIAL[-1] | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION Riparian R (Per Bank) AGE [1] -NONE/LITTLE [3] -NONE/LITTLE [3] WCROP [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 CITY [POOLS & RIFFLES!] Current All That Apply) -TORRENTIAL[-1] -NOVE [-1] -INTERSTITIAL[-1] Max 12 | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION Riparian R (Per Bank) AGE [1] | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION Riparian R (Per Bank) AGE [1] -NONE/LITTLE [3] -NONE/LITTLE [3] WCROP [0] -MODERATE [2] WCROP [0] -HEAVY/SEVERE[1] Max 10 CITY [POOLS & RIFFLES!] Current All That Apply) -TORRENTIAL[-1] -NOVE [-1] -INTERSTITIAL[-1] Max 12 | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R | BANK EROSION Riparian R (Per Bank) AGE [1] | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R GI - WIDE > 50m [4] GI - WIDE > 50m [4] GI - WODERATE 10-50m [3] GI - SHRUB OR OLD FIELD [2] GI - URBAN OR INDUSTR GI - WARROW 5-10 m [2] GI - SHRUB OR OLD FIELD [2] GI - URBAN OR INDUSTR GI - NARROW 5-10 m [2] GI - FENCED PASTURE [1] GI - MINING/CONSTRUCT GI - NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY (Check 1 ONLY!) GCHeck 1 or 2 & AVERAGE) GCHeck 1 O.7-1m [4] GI - POOL WIDTH > RIFFLE WIDTH [1] GI - FAST[1] GI - MODERATE [1] GI - SLOW [1] | BANK EROSION Riparian R (Per Bank) AGE [1] | - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R GI - WIDE > 50m [4] GI - FOREST, SWAWP [3] GI - WODERATE 10-50m [3] GI - SHRUB OR OLD FIELD [2] GI - WIDE - VERY NARROW 5-10 m [2] GI - FENCED PASTURE [1] GI - MONE [0] COMMENTS: 5. [POOL/GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) GI - FOOL WIDTH > RIFFLE WIDTH [2] GI - FAST[1] GI - MONE [1] GI - MONE [1] CURRENT VELOCITY (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) GI - FAST[1] GI - O.7-1m [4] GI - POOL WIDTH > RIFFLE WIDTH [1] GI - MODERATE [1] GI - MODERATE [1] GI - MODERATE [1] GI - MODERATE [1] GI - FAST[1] GI - MODERATE [1] | BANK EROSION Riparian R (Per Bank) AGE [1] | n - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R GID - WIDE > 50m [4] GID - WIDE > 50m [| BANK EROSION Riparian R (Per Bank) AGE [1] | n - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) D - WIDE > 50m [4] D - FOREST, SWAMP [3] D - CONSERVATION TILL D - MODERATE 10-50m [3] D - SHRUB OR OLD FIELD [2] D - URBAN OR INDUSTR OPEN PASTURE, ROV D - WIDE - VERY NARROW <5 m [1] D - FENCED PASTURE [1] D - MINING/CONSTRUCT O - MINING/CONSTRUCT S - NONE [0] COMMENTS: 5 . POOL / GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) C - SIM [6] D - POOL WIDTH = RIFFLE WIDTH [2] D - CONSERVATION TILL CURBAN OR INDUSTR CURRENT VELOCY (Check 1 ONLY!) CURRENT VELOCY (Check 2 AVERAGE) CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE DEPTH RUN DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE/RUN SUBSTRATE | BANK EROSION L R (Per Bank) AGE [1] | n - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predomination Per Bank) L R (Most Predominat | BANK EROSION Riparian R (Per Bank) AGE [1] | n - |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) D - WIDE > 50m [4] D - FOREST, SWAMP [3] D - CONSERVATION TILL D - MODERATE 10-50m [3] D - SHRUB OR OLD FIELD [2] D - URBAN OR INDUSTR OPEN PASTURE, ROV D - WIDE - VERY NARROW <5 m [1] D - FENCED PASTURE [1] D - MINING/CONSTRUCT O - MINING/CONSTRUCT S - NONE [0] COMMENTS: 5 . POOL / GLIDE AND RIFFLE/RUN QUALITY MAX. DEPTH MORPHOLOGY (Check 1 ONLY!) (Check 1 or 2 & AVERAGE) C - SIM [6] D - POOL WIDTH = RIFFLE WIDTH [2] D - CONSERVATION TILL CURBAN OR INDUSTR CURRENT VELOCY (Check 1 ONLY!) CURRENT VELOCY (Check 2 AVERAGE) CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE DEPTH RUN DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE CHECK ONE OR CHECK 2 AND AVERAGE RIFFLE/RUN SUBSTRATE | BANK EROSION L R (Per Bank) AGE [1] | n = |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Depth | BANK EROSION Riparian R (Per Bank) AGE [1] | n = |
| RIPARIAN WIDTH L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Most Predominant Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (Per Bank) L R (Most Predominant Per Bank) L R (Per Bank) L R (December Bank) L R (Per Bank) | BANK EROSION Riparian R (Per Bank) AGE [1] | n 1 |
| RIPARIAN WIDTH | BANK EROSION Riparian R (Per Bank) AGE [1] | n 1 |
| RIPARIAN WIDTH | BANK EROSION Riparian R (Per Bank) AGE [1] | n = |
| RIPARIAN WIDTH | BANK EROSION Riparian R (Per Bank) AGE [1] | n 1 |

Macrobenthos Qualitative Sample List

| . 1 | ORDER | FAMILY | GENUS | SPECIES | | | 0.000 | Parasite |
|------|--|----------------------------------|------------------------|--|--|--|-------|----------------------|
| Ψ | Vematomorpha | | | | | | 0.000 | Predators/P |
| | lydracarina- Trombidiformes | DI | | | | 4 | 0.000 | Omnivore |
| | Tubellaria | Planaria | | | | | 0.000 | Filters |
| | Porifera | Spongillidae | Corbinula | fluminea | 7 | 3.2 | 0.295 | |
| ۲β | Pelecypoda | Corbiculidae | Corbicula Dreissena | polymorpha | | U.E. | 0.000 | |
| ı | | Dreissenidae Unionidae | Villosa | ins | | | | Filters |
| ╌ | | Sphaeriidae | VINUSA | 110 | | 8 | 0.000 | Filters |
| ᄬ | Gastropoda | Ancylidae | | | | 6 | | Scrapers |
| | Gastropoda | | | | | 6.9 | | Scrapers |
| ᅆ | | Lymnaeidae | Fossaria | | | 6 | | Scrapers |
| ۰ŀ | | Lymnaeidae Physidae | гозвана | | 13 | 8 | | Scrapers |
| ۳ŀ | | Physidae | Physelia | | | 8 | | Scrapers |
| Н | | Planorbidae | Пузова | | | 7 | | Scrapers |
| Н | | Planorbidae | Planorbula | | | 7 | 0.000 | Scrapers |
| Н | | Pleuroceridae | | | | | 0.000 | Scrapers |
| ŀ | | Bithyniidae | Bithynia | tentaculata | | | 0.000 | Scrapers |
| 11/ | Annelida | Hirudinea | | | | 10 | | Gathers |
| 5 | | Oligochaeta | | | 23 | | | Gathers |
| 6 Ī | Decapoda | | | | | В | | Predators |
| | Amphipoda | | | | 2 | 4 | | Shredders |
| 4 [i | Isopoda | Aselidae | | | | 8 | | Shredders |
| Œ | Ostracoda | I | | | | 8 | | Scavenger |
| | Ephemeroptera | Caenidae | | <u> </u> | | 7 | | Gathers |
| 3 | | Caenidae | Caenis | | 1 | 3.1 | | Gathers |
| [| | Ephemeridae | Hexagenia | | | 3.6 | | Gathers |
| 5 | | Baetidae | Baetis | ļ | 4 | 3.1 | | Gathers |
| Ĺ | | Baetidae | Baetis | brunneicolor | | 4 | | Gathers |
| Ĺ | A CONTRACTOR OF THE CONTRACTOR | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| Ţ | | Baetidae | Callibaetis | | | 5.6 | | Gathers |
| 4 | | Heptageniidae | Stenacron | - Indianala | | 3.1 | | Scrapers |
| ŀ | | Heptageniidae | Stenacron | gildersleevei | 1 | 3.1 | | Scrapers |
| ŀ | | Heptageniidae | Stenonema | Laviauum | + | 1,9 | 0.000 | Scrapers Scrapers |
| ŀ | | Heptageniidae | Stenonema | exiguum | | | 0.000 | Filters |
| ŀ | | Isonychiidae | Isonychia | | | 2 27 | | Gathers |
| ŀ | | Leptohyphidae | Tricorythodes | | | 2.7 | | Gathers |
| H | | Siphlonuridae Ephemerellidae | Timpanoga | + | | 1 | | Gathers |
| ŀ | | Leptophiebiidae | - mipanoga | | | 2 | | Gathers |
| ٠ŀ | Coleoptera | Dytiscidae | | | | 5 | | Predators |
| 7 | Совория | Gyrinidae | | | | 5 | | Predators |
| "ŀ | | Gyrinidae | Dineutus | | | 3.7 | | Predators |
| 33 | | Haliplidae | Diriodius | | 1 | 7 | 0.092 | Predators |
| ~ | | Dryopidae | | | | 5 | | Predators |
| 12 | | Elmidae | | | 8 | 4 | 0.421 | Gathers |
| - | · · · · · · · · · · · · · · · · · · · | Psephenidae | Psephenus | | | 4 | 0.000 | Scrapers |
| ı | | Hydrophiloidae | | Í | | | 0.000 | Gathers |
| 7 | | Hydrophiloidae | Tropisternus | | 1 | | | Gathers |
| ı | Megaloptera | Sialidae | | | | 4 | 0.000 | Predators |
| 1 | • | Corydalidae | Corydalus | | | 4 | 0.000 | Predators |
| 1 | Trichoptera | Brachycentridae | Brachycentrus | | 1 | 1 | 0.000 | Filters |
| Ī | | Helicopsychidae | Helicopsyche | | | 3 | 0.000 | Scrapers |
| [| | Helicopsychidae | Helicopsyche | borealis | | 3 | | Scrapers |
| 16[| | Hydropsychidae | | | | 4 | 0.000 | Filters |
| [| | Hydropsychidae | Hydropsyche | | | 4 | | Filters |
| L | | Hydropsychidae | Hydropsyche | betteni | | 4 | | Filters |
| ļ | | Hydropsychidae | Hydropsyche | scalaris | | 4 | | Filters |
| ļ | | Hydropsychidae | Symphitopsyche | | | 4 | | Filters |
| - ! | | Hydroptilidae | | ļ | | 4 | | Gathers |
| 1 | | Hydroptilidae | Hydroptila | ļ | | 3.2 | | Gathers |
| ļ | | Leptoceridae | L,, | | 1 | 4 | | Shredders |
| Į | | Leptoceridae | Nectopsyche | ļ | + | 4 | | Shredden |
| ļ | | Molannidae | ļ | + | + | 6 | | Gathers |
| ļ | | Philopotamidae | Us samelic | | + | 3 | 0.000 | Filters |
| - | | Phryganeidae | Hagenella | | | | 0.000 | Shredden |
| ١ | | Polycentropodidae | Cyrnellus | | + | 6 | | Filters |
| اء | Homintoro | Psychomylidae | Lype | + | + | 2 | 0.000 | Gathers Predators |
| 껙 | Hemiptera | Belostomatidae Belostomatidae | Belostoma | t | | | 0.000 | Predators |
| 34 | | Conxidae | Delosionia | | 1 | 10 | | Predators |
| 3 | | Gerridae | | t | +-'- | 5 | 0.100 | Predators |
| 4 | | Gerridae | Trepobates | † | t | 5 | 0.000 | Predators |
| ł | | Notonectidae | Notonecta | | 1 | † • | 0.000 | Predators |
| ł | | Nepidae | | † | | | 0.000 | Predators |
| ł | | Nepidae | Ranatra | | 1 | † | 0.000 | Predators |
| ł | Plecoptera | Peridae | Periesta | | † | 1 | 0.00 | Predators |
| ł | | Peridae | Neoperla | | + | i | 0.00 | Predators |
| ł | | Chloroperlidae | 1 | t | 1 | i | 0.00 | Predators |
| ١ | Odonata-Anisoptera | Aeshnidae | 1 | 1 | 1 | 3 | | Predators |
| - | | Aeshnidae | Boyeria | 1 | 1 | 3 | 0.00 | Predators |
| - 1 | | Gomphidae | | | 1 | 1 | | Predators |
| 1 | | Cordulegastridae | | T | 1 | 3 | | Predators |
| 22 | | Cordulidae | 1 | 1 | 5 | 5 | | Predators |
| ~ | | Libellulidae | | 1 | | 9 | | Predators |
| | Odonata-Zygoptera | Calopterygidae | 1 | 1 | | 5 | | Predators |
| 4 | : | Calopterygidae | Calopteryx | | 1 | 3.7 | | Predators |
| 6 | | Coenagrionidae | - 2.000.00.70 | 1 | 1 | 6.1 | | Predators |
| 5 | | Coenagrionidae | Argia | 1 | 16 | 5.1 | | 4 Predators |
| 30 | | Coenagrionidae | Engallagma | 1 | 14 | 9 | 1.65 | B Predators |
| | | Lestidae | 1 | † | 1 | 9 | | Predators |
| | Diptera | Ceratopogonidae | | | 1 | 5.7 | | Gathers |
| 11 | | Blood-red Chironomidae | 1 | 1 | 3 | 8.1 | | Gathers |
| 12 | | Other Chironomidae | | 1 | T - | 6 | | 0 Gather |
| 35 | | Culicidae | 1 | 1 | 1 : | . в | | 1 Shredder |
| 10 | | Simuliidae | | 1 | T - | 6 | 0.00 | 0 Filters |
| 2 | | Tipulidae | | 1 | | 3 | | 0 Predators |
| | - | | 1 | | | | | Gather |
| - 1 | ļ. | Stratiomyidae | 3 | | | | | |

| TAXA RICHNESS | 14 |
|---------------------------------|-------|
| FBI | 6.167 |
| Scraper/Filter | 1.857 |
| EPT/Chironomidae | 1.333 |
| % Contribution of Dominant Taxa | 0.23€ |
| EPT Index | 1.000 |
| Community Similarity Indices | 0.643 |
| • | 0.217 |
| СРОМ | 0.040 |
| Total Number Collected | 100 |

Comm. Loss = 0.643 Jaccard Coef. = 0.217

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

| | | | | | | | | | page | | of | | _ | |
|-----------------------|---------------|---------|--|----------|--|----------|-----------------|---|--|----------|--|--|--------------|--|
| STREAM NA | ME Bur | Cree | K | | | | LOCATION | Upstream or | GA | que, | nce u | ~/B | . | |
| STATION # 3 RIVERMILE | | | | | | | STREAM CLASS | | | | | | | |
| LAT | - | | LON | G | | | RIVER BASIN | | | | | | | |
| STORET# | | | | | | | AGENCY | | | | | | 1 | |
| COLLECTED | BY ESB | wa | | DA' | TE <u> 0</u> | /13/04 | LOT# | | | | | | 1 | |
| TAXONOMIS | TEJB, U | UGC | | DA' | TE | | SUBSAMPL | E TARGET 🗅 100 🗅 2 | 200 🗖 | 300 🗆 | Other | | 1 | |
| | | 77.4. | | •• | | | | | | | | | 4 | |
| | | Lnte | T | | | | nd Species name | | | Т | τ | | 1 | |
| | rganisms I | | No. | LS | TI | TCR | 0 | rganisms | No. | LS | TI | TCR | 4 | |
| Oligochaeta | | | | ļ | <u> </u> | | Megaloptera | | | <u> </u> | | |] | |
| | | | ļ | <u> </u> | <u> </u> | <u> </u> | | | | | <u> </u> | |] | |
| Hirudinea | | | | | <u> </u> | • | Coleoptera | MTHMI - Haliph | 1 × 1 | 1 | wee | , | 6 | |
| | | | | | | • | RIFFIE Bertle | W1 (9) | 15 | A | WOL | | ~ | |
| Isopoda | | | | | 1 | | Whirlow | 1111 | H | A | uu | , | 1 | |
| | | | | | | | larvae | 1 - Haliplidad | × | I | WOL | , | | |
| Amphipoda | | | | | | 1 | Dipleta Mercan | 111 (2) | 3 | Ī | WOL | , | 1 | |
| | | | | 1 | | † | drawith | | 19 | I | | <u> </u> | <u>ئ</u> ے ا | |
| Decapoda | | | | | - | ١. | Brn Chriad | | 7 | E | 462 | <u> </u> | `> | |
| Journal | | | | | ╁ | | BH Bed | VIII (C) | | _ | wol | | | |
| Ephemeroptera | <u> </u> | | - | · . | | <u> </u> | \$6 me | 1 (0 | 1 | 1- | U6L | <u>'</u> - | | |
| Bastid | I LACTE III | <u></u> | | - | _ | | 144 | 13 M 13 M 1 M 1 M 1 M 1 M 1 M 1 M 1 M 1 | | <u> </u> | | | | |
| Dartia | Mill | 0 | 8 | E | w | 1 . | Gastropoda - 17 | MAHAMIII | 19 | 1 | WL | 1 | U | |
| | | | ļ | <u> </u> | . | <u> </u> | ` | Physilal | | | | | , i | |
| | Ŋ. | | | | | | | | <u> </u> | | ì | | | |
| | | | | | | | Pelecypoda | | | | | | | |
| Plecoptera | | | | | | (, | | | | | | | | |
| | | | • | ,, ,, | 717 | | 3 | | | | | | | |
| | | | | | | | Other | | | | | | İ | |
| | | | | | | | Horsehairm | | 3 | A | WOL | | | |
| | | | | | | | Coentronidae | 111 (3) | 77/14 | FUE | 17 | | | |
| richoptera | | | | | | | Planarian | 111 | | A | <u> </u> | | | |
| • | | | | | | | Odonata | W111 6 | 7 | F | | | | |
| | • | * | A THE STREET | _ | | 1 | 5 | ~ (1) | - | | WIL | | | |
| | | | | | | | -, | (उप) | 42 | エ | 462 | 1 | | |
| | | | <u> </u> | | <u> </u> | | | | | | | | | |
| | | | ļ., | | <u> </u> | | | | <u> </u> | | | | | |
| | | | | | <u> </u> | | | | | | | | | |
| lemiptera . | | | | | | | | | | | |] | | |
| under bodhan | 111 | (3) | Z | A | wol | | | | | | | | | |
| | -1 | | | | | | | | | | | | | |

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| | | | | | | | | | | | | | | | - | | |
|-------------------------------------|------------|--------------|--------------|------------|------------|--|-------------|------------|--------------|-------------|----------------|-------------------|--|-------|------|----|---|
| STREAM NAME | 3arr | - (| 266 | eK | | LOCATION | Ups | +10 | ea M | ٠, | >+ | Confluence w/ | 3, | 3_ | Cre | eK | |
| STATION # RIVERMILE | | | | | STREAM CL | STREAM CLASS | | | | | | | | | | | |
| LAT | LO | NG | | | | RIVER BASII | RIVER BASIN | | | | | | | | | | |
| STORET# | | | | | | AGENCY | | | | | | · | | | | | |
| INVESTIGATORS | 773 | 3 | W | 5-6 | A | RS | | | | L | 1 TO | NUMBER | | | | | |
| FORM COMPLETED | BY | E) | | | | DATE 10 | 13/0 | N W | PM | R | EAS | ON FOR SURVEY | | | | | |
| | | | | | | | | | | | | | | | | | |
| HABITAT TYPES | | Cobl Subr | ole_ nerg | ed M | % Iacro | age of each habitat t ☐ Snags% phytes)②% | V | egeta | nt ated 1 | Banl her | cs_ <u>l</u> (|)_% Sand_\C | <u>%</u> | | | | |
| SAMPLE | Ge | ar u | sed | 7 | Б-fra | me 🛭 kick-net | (| 1 O | ther_ | | | | | | | | |
| COLLECTION | 1 | | | * | | les collected? | | 3 | ۵ | fron | ı ban | k 🚨 from boat | : | | | | |
| • | | | te th | | | of jabs/kicks taken | in eac | eget | ated : | Banl | ks | O Sand C | <u>. </u> | | | | |
| | | | | | | phytes 10 | | | 0 0 | ther | (|) | | | | | |
| GENERAL COMMENTS | | | | | | | | - | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | <u> </u> | | | | | | • | | | | | · | | | | | |
| QUALITATIVE I Indicate estimated | IST abu | INC | G O | F A : 0 | QUA = A | ATIC BIOTA bsent/Not Observe | ed, 1 : | = R | are, | 2 = | Co | mmon, 3= Abunda | nt, 4 | l =] | Dom | | |
| Periphyton | | | | | (O) | 1 2 3 4 | | Slir | nes | | | | (v) | 1 | 2 | 3 | 4 |
| Filamentous Algae | | | | | Ó | 1 (2) 3 4 | | Ma | croi | nver | tebr | ates | 0 | 1 | (2) | 3 | 4 |
| Macrophytes | | | | | <u>M</u> | 1 2 3 4 | | Fisl | h | | | | 0 | 1 | 죋 | 3 | 4 |
| | | | | | | , | | | | | | | | , | | | |
| FIELD OBSERVA | ATIC | ONS | OF | | | | | | | | | | | | | | |
| Indicate estimated | | | | : | 0 = 0 | Absent/Not Observ | | | | | | ganisms), 2 = Com | | | | | |
| | | | | | orga | nisms), 3= Abund | ant (> | 10 | orga | ınis | ms), | 4 = Dominant (>50 | or | gan | ısms |) | |
| Davifora | | 1 | 2 | 2 | ۱.۱ | Anisoptera | Λ | 1 | 2 | ٦ | 4 | Chironomidae | 0 | 1 | 2 | 3 | 4 |
| Porifera Hydrozoa | 0 | 1 | 2 | 3 | 4 | Zygoptera | 0 | 1 | 2 | 3 | 4 | Ephemeroptera | 0 | 1 | 2 | 3 | 4 |
| Platyhelminthes | 0 | 1 | 2 | 3 | 4 | Hemiptera | 0 | 1 | 2 | 3 | 4 | Trichoptera | 0 | 1 | 2 | 3 | 4 |
| Turbellaria | 0 | 1 | 2 | 3 | 4 | Coleoptera | 0 | 1 | 2 | 3 | 4 | Other | 0 | 1 | 2 | 3 | 4 |
| Hirudinea | 0 | 1 | 2 | 3 | 4 | Lepidoptera | 0 | 1 | 2 | 3 | 4 | | = | - | _ | • | |
| Oligochaeta | 0 | 1 | 2 | 3 | 4 | Sialidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Isopoda | 0 | 1 | 2 | 3 | 4 | Corydalidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Amphipoda | 0 | 1 | 2 | 3 | 4 | Tipulidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Decapoda | 0 | 1 | 2 | 3 | 4 | Empididae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Gastropoda | 0 | 1 | 2 | 3 | 4 | Simuliidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| Bivalvia | 0 | 1 | 2 | 3 | 4 | Tabinidae | 0 | 1 | 2 | 3 | 4 | | | | | | |
| | | | | | | Culcidae | 0 | 1 | 2 | 3 | 4 | | | | | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | ſ | STREAM NAME Bar | r (rook | LOCATION | Upstream | of Contine | (10 m/ B | ia Creek | l |
|------------|----------|----------------------------|--|---|-------------------------|---|------------|--------------------|---------|
| | | | VERMILE | STREAM C | | J , 14, 14, 1 | | 3 | |
| | | | ONG | RIVER BAS | | | | | |
| | | STORET # | | AGENCY | | | | | |
| | · | INVESTIGATORS | ARSWOL | | | 27 | | | |
| | | FORM COMPLETED BY | | DATE 10/ TIME 09 | 13/04 -00 AM PM | REASON FOR SU | JRVEY | | · |
| | | WEATHER CONDITIONS | rain shower | n (heavy rain) (steady rain) rs (intermittent) cloud cover lear/sunny | hours | Has there been a he Yes \(\sum \) No Air Temperature \(\) Other | | ast 7 days? | |
| e 5 | DOP | SITE LOCATION/MAP | Draw a map of the s | site and indica | te the areas sam | ed (or attach a pho | otograph) | Velait | a |
| • | | | 1.0 | ·1 | 0.07 | .5 1.0 | 31 | 04 | F (* *) |
| | .a .a | 0.19 | 1.5 | .3 | 0.16 | 1.5° 2.0 | 3.4 | 0.41 | |
| | ·2 | 0.07 | 2.5 | .4 | 0.09 | 3.5 | .4 | 0.13 | |
| | .2 | 0.12 | 3.0 | ٠٧ | 0.04 | 3.0 | • 5 | C106 | |
| | .2 | 0.27 | 3.5 | •5 | 0.13 | 3.5 | • 6 | | 2 |
| , | .3 | 0.35 | 4.0 | .5 | 0.11 | 4.0 | | <i>ः०५</i> ०.०३ | + |
| | •4 | 0.23 | 4.5 | •6 | 0.14 | 4.5 | ; s | 0.01 | |
| | 4 | 0.25 | 5.0 5.5 | ·6 注意。7 | 0.17 | 5.0 | RB | | |
| | .4 | 0.27 | [[~ | ···· | 0.03 | 5.5 | 1112 | | |
| | •3 | 0.17 | 6.5 | • 3 • l | | | | | |
| | .3 | 0.16 | 7.0 | RB | | | | | |
| • | .3 | 1 ^ 1 1 | | | | | | | |
| | RE | <i>p</i> | | | | W | | | |
| | | | | • | | N | | | |
| | | | | | | | | | |
| | | STREAM CHARACTERIZATION | Stream Subsystem | ntermittent 🗅 | Tidal | Stream Type Coldwater | Varmwater | | |
| | | | Stream Origin Glacial Non-glacial monta | Sprin | g-fed ure of origins | Catchment Area | km² | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSH FEATURES | | Predomin Forest Field/P Agricu Reside | ltural 🚨 Other | rial | Local Watershed NPS P No evidence Some Obvious sources Local Watershed Erosic None Moderate | potential sources |
|------------------------------------|--------------------------------|---|--|---------------------------------------|---|---|
| RIPARIAN VEGETAT (18 meter b | ION | Indicate ☐ Trees dominan | the dominant type and Shritter t species present | record the do | minant species present Grasses Arass | baceous |
| INSTREAM FEATURE | | Estimate Samplin Area in Estimate | ed Reach Length ed Stream Width g Reach Area km² (m²x1000) ed Stream Depth veg) | mm²km²m | Canopy Cover Partly open Partly High Water Mark Proportion of Reach Re Morphology Types Riffle 30 % Pool 50 % Channelized Yes Dam Present Pes | 5_m epresented by Stream Run_30_% □ No |
| LARGE W DEBRIS | OODY | LWD Density | Om² | ¹ /km² (LWD/ 1 | each area) | , |
| AQUATIC VEGETAT | | Roote Floati domina | d emergent Rong Algae Att | oted submerge ached Algae | | g 🔾 Free floating |
| WATER Q | QUALITY | Temper Specific Dissolve pH 7 Turbidi | ature 59.7°¢F Conductance 436.5 ed Oxygen 13.8 ~ | 15.4°C 2µmhos 3/4 | Water Odors Normal/None | |
| SEDIMENT/ SUBSTRATE | | Odors Norm Cherr Other | nical Anaerobic | □ Petroleum □ None te □ Profu | □ Relict shells □ Looking at stones which embedded, are the und | ☐ Paper fiber ☐ Sand Other |
| INO | RCANIC SUR | STRATE | COMPONENTS | | ORGANIC SUBSTRATE C | OMPONENTS |
| 1110 | (should a | dd up to | 100%) | · · · · · · · · · · · · · · · · · · · | (does not necessarily add | up to 100%) |
| Substrate Type | Diame | ter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area |
| Bedrock | | | | Detritus | sticks, wood, coarse plant materials (CPOM) | |
| Boulder | > 256 mm (10' | <u> </u> | 5 | Muck-Mud | black, very fine organic | |
| Cobble | 64-256 mm (2. 2-64 mm (0.1" | - | 45 | Ividok-ividd | (FPOM) | |
| Sand | 0.06-2mm (gri | <u>_</u> | 35 | Marl | grey, shell fragments | |
| Silt | 0.004-0.06 mm | | 10 | 1 | J | コ |
| Clay | < 0.004-0.00 mm (s | | 5 | 1 | | - • |
| <i>J</i> | 1 2 2 2 3 3 3 4 4 | , | 1 | 1 | <u></u> | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| III III III III III III III III III II | |
|--|---|
| STREAM NAME BAFF Creek | LOCATION Upotream or Cont. w/ Big Creek |
| STATION# 3 RIVERMILE | STREAM CLASS |
| LAT LONG | RIVER BASIN |
| STORET # | AGENCY |
| INVESTIGATORS EDB, WG-L, ARS | |
| FORM COMPLETED BY | DATE 10/13/04 REASON FOR SURVEY |
| | 1 |

| > | Habitat | | Condition | Category | |
|--|---|---|---|--|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Available Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| each | score 3 | 20 se 19 (c) 8 1477 - 46 | 98 (14/913) 127/08 | and post of | |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ited | score 8 | 20 840 (+) 81 (12) (16 | nggygaggilai aysallig | | |
| be evalua | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ers to | SCORE | | \$250025004B;ENFAC4E | | |
| Paramete | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | score 3 | 20 19 18-17 16 | 75 704 - 13 FD 90 | 10-7985,853,854,854,6 | |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | |
| | score 8 | | 15,014,013,42,714 | | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat Parameter | | Conditio | n Category | |
|-----|--|--|--|---|---|
| Ļ | - | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream read channelized and disrupted. Instream habitat greatly altered removed entirely. |
| | SCORE 8 | 20 19. 18 17 16 | js (14) eps (12) ju | 30 -9 (8) 21 - 6 | 5 4 5 3 5 |
| | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note-channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| 5 | SCORE 3 | 20, 49, 48, 47, 16 | (15° 18, 183, 12° 11° | 10 9 8 2 7 6 | 52.24 (50) 256576 |
| | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughin; 60-100% of bank has erosional scars. |
| s | SCORE _ (LB) | Left Bank 10 '9 | 3.8 2. 7 46 | 5 4 119 | erosional se |
| s | SCORE 1 (RB) | Right Banksup (10 0.99 | 3-8 2.7 5 × | 3.4047093 | 2.000 |
| P e | Protection (score ach bank) Note: determine eft or right side by acing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambar vegetation is very high vegetation has been removed to 5 centimeters or less in average stubble height. |
| | CORE (LB) | Left Bank to 9 | 2. 7. 7. 6. | 105 apr. 4 2 2 3 pc. | 16 (2 11 (12 (3))). |
| 8 | CORE <u>l</u> (RB) | Right Bank 310 39 | 8 7 6 | 5. 4, 19. | |
| V | egetative Zone Vidth (score each | activities (i.e., parking | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | | Left Banks 10 -9 | 8 (1.7 % 6 % | 15 4" (1 state) | 2 Degre |
| S | CORE (RB) | Right Bank - JO: 9 | 8 3 7 6 | 5 4 8 | 2. 7.3.290 |

Total Score 42

Macrobenthos Qualitative Sample List

| ial# | | | | | | | | |
|--|---------------------------------------|--|-------------------|---------------|-------------------|---|--|---|
| | ORDER | FAMILY | GENUS | SPECIES | COUNT | TO CO ANGELIA | 1-2: | |
| 21 | Nematomorpha | | | O. EUIES | | TOLERANCE VALUES | | |
| | Hydracarina-Trombidiformes | | | | 3 | | | Parasite |
| 23 | | Planaria | + | | ↓ | | 0.000 | Predators/Parasite |
| | Porifera | | | | 3 | 4 | | Omnivore |
| | | Spongillidae | | | | | | Filters |
| 31 | Pelecypoda | Corbiculidae | Corbicula | fluminea | | 3.2 | | Filters |
| | | Dreissenidae | Dreissena | polymorpha | | | | Filters |
| | | Unionidae | Villosa | iris | | | | |
| 18 | | Sphaeriidae | | - | | | | Filters |
| | Gastropoda | Ancylidae | | | | . 8 | 0.000 | Filters |
| 20 | | Lymnaeidae | | | | 6 | 0.000 | Scrapers |
| | | Lymnasidae | F | | <u> </u> | 6.9 | 0.000 | Scrapers |
| 19 | | | Fossaria | | L | 6 | 0.000 | Scrapers |
| 19 | · | Physidae | | | 15 | 8 | 1.364 | Scrapers |
| | | Physidae | Physelia | | | 8 | 0.000 | Scrapers |
| | | Planorbidae | | | | 7 | | Scrapers |
| | | Planorbidae | Planorbula | | | 7 | 0.000 | Corapers |
| | | Pleuroceridae | | | | | 0.000 | Scrapers |
| | | Bithyniidae | Bithynia | tentaculata | | | | Scrapers |
| 1 | Annelida | Hirudinea | Didiyina | Terriacuata | | | 0.000 | Scrapers |
| 25 | | Oligochaeta | + | | <u> </u> | 10 | 0.000 | Gathers |
| | Decapoda | Oligochiaeta | | | | | 0.000 | Gathers |
| | | | | | | 8 | | Predators |
| 04 | Ampripode Isano de | | | | | 4 | 0.000 | Shredders |
| 24 | Isopoda | Asellidae | | | | 8 | 0.000 | Shredders |
| | Ostracoda | | | | | В | | |
| | Ephemeroptera | Caenidae | | | | 7 | 0.000 | Scavengers |
| 13 | | Caenidae | Caenis | | | | | Gathers |
| | · · · · · · · · · · · · · · · · · · · | Ephemeridae | Hexagenia | | - | 3.1 | | Gathers |
| 15 | | Baetidae | | | | 3.6 | 0.000 | Gathers |
| | | Baetidae | Baetis | | 7 | 3.1 | 0.247 | Gathers |
| | | | Baetis | brunneicolor | | 4 | 0.000 | Gathers |
| | | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| | | Baetidae | Callibaetis | | | 5.6 | | Gathers |
| 14 | | Heptageniidae | Stenacron | | | 3.1 | 0.000 | Scrapers |
| | | Heptageniidae | Stenacron | gildersleevei | | 3.1 | | |
| | | Heptageniidae | Stenonema | 2 | | 4 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | and an income | | | 0.000 | Scrapers |
| | | Isonychiidae | | exiguum | | 1.9 | 0.000 | Scrapers |
| | | | Isonychia | | | 2 | 0.000 | Filters |
| | | Leptohyphidae | Tricorythodes | | | 2.7 | 0.000 | Gathers |
| | | Siphionuridae | | | | 7 | | Gathers |
| | | Ephemerellidae | Timpanoga | | | 1 | | Gathers |
| | | Leptophlebiidae | | | | 2 | 0.000 | Gathers |
| 8,9 | Coleoptera | Dytiscidae | | 1 | | 5 | 0.000 | Predators |
| 37 | | Gyrinidae | | | 3 | 5 | | |
| - 1 | | Gyrinidae | Dineutus | | - 3 - 1 | | 0.170 | Predators |
| 27,33 | | Haliplidae | 0.,00,00 | | | 3.7 | 0.042 | Predators |
| _ ` I | - | Dryopidae | | | | . 7 | | Predators |
| 28,32 | ** | | | | | 5 | 0.000 | Predators |
| 20,02 | | Elmidae | | | 4 | 4 | 0.182 | Gathers |
| - } | | Psephenidae | Psephenus | | | 4 | 0.000 | Scrapers |
| _ | | Hydrophiloidae | | | | | 0.000 | Gathers |
| 7 | | Hydrophiloidae | Tropistemus | T | 9 | | | Gathers |
| | Megaloptera | Sialidae | | - | | 4 | | |
| ĺ | | Corydalidae | Corydalus | | | | | Predators |
| ſ | Trichoptera | Brachycentridae | | | | 4 | | Predators |
| 1 | | Helicopsychidae | Brachycentrus | | | 11 | 0.000 | Filters |
| 1 | | Unicepsychidae | Helicopsyche | | | 3 | 0.000 | Scrapers |
| 16 | | Helicopsychidae | Helicopsyche | borealis | | 3 | 0.000 | Scrapers |
| '" | | Hydropsychidae | | | | 4 | 0.000 | |
| | | Hydropsychidae | Hydropsyche | | | 4 | 0.000 | |
| L | | Hydropsychidae | | betteni | - | 4 | 0.000 | |
| L | | Hydropsychidae | | scalaris | | 4 | | |
| L | | Hydropsychidae | Symphitopsyche | | | | 0.000 | rikers |
| Г | | Hydroptilidae | -у.п.р.п.переуеле | | $\overline{}$ | 4 | 0.000 | |
| 1 | | Hydroptilidae | Lhedrondilo | | | 4 | | Gathers |
| T I | | | Hydroptila | | | 3.2 | 0.000 | Gathers |
| - t | | Leptoceridae | | | | 4 | 0.000 | Shredders |
| | | Leptoceridae | Nectopsyche | | | 4 | 0.000 | Shredders |
| Į. | | Molannidae | | | | 6 | | Gathers |
| L | | Philopotamidae | | | + | 3 | 0.000 | Filtere |
| 1 | | Phryganeidae | Hagenella | | + | - 4 - | 0.000 | Cheedal |
| Г | | Polycentropodidae | Cyrnellus | | | | | Shredders |
| F | | Psychomyiidae | | | | 6 | 0.000 | iners |
| 36 | Hemiptera | Belostomatidae | Lype | | | 2 | | Gathers |
| - 1 | | Belostomatidae | Balantama | | | | | Predators |
| 34 | | | Belostoma | | | | | Predators |
| 34 | | Corixidae | | T | 3 | 10 | 0.341 | Predators |
| 3 <u>L</u> | | Gerridae | | | | . 5 | 0.000 | Predators |
| L | | Gerridae | Trepobates | | | 5 | 0.000 | Predators |
| L | | Notonectidae | Notonecta | | | | | |
| | | Nepidae | | | | | 0.000 | Predators |
| Г | | Nepidae | Ranatra | | | | 0.000 | Predators |
| ĪĒ | Piecoptera | | Periesta | | | | | Predators |
| ļ. | | Peridae | | | | 1 | 0.000 | Predators |
| F | | Chloroperlidae | Neoperla | | | 1 | 0.000 | Predators |
| ار ا | | | | | | 11 | 0.000 F | Predators |
| - 1 | - dodra-Minsopter 8 | Aeshnidae | | | | 3 | | redators |
| - | | Aeshnidae | Boyeria | | | 3 | | Predators |
| Ļ | | (-amphides | | | | 1 | | Predators |
| - 1 | | Gomphidae | | | | 3 | 0.000 | Predators |
| | | Cordulegastridae | | | | | | redators |
| 22 | | Cordulegastridae Corduliidae | | | - | | 0.0001 | |
| | | Cordulegastridae | | | 6 | 5 | 0.341 F | redators |
| | | Cordulegastridae Corduliidae Libellulidae | | | 6 | 5 9 | 0.341 F | redators |
| | Odonata-Zygoptera | Cordulegastridae Corduliidae Libellulidae Calopterygidae | Colontono | | 6 | 5 9 5 | 0.341 F 0.000 F 0.000 F | Predators Predators |
| | Odonata-Zygoptera | Cordulegastridae Corduliidae Libellulidae Calopterygidae Calopterygidae | Calopteryx | | | 5 9 5 3.7 | 0.341 F 0.000 F 0.000 F | Predators Predators Predators |
| 4 | Odonata-Zygoptera | Cordulegastridae Corduliidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae | | | 6 | 5 9 5 3.7 6.1 | 0.341 F 0.000 F 0.000 F | Predators Predators |
| 4 6 5 | Odonata-Zygoptera | Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae | Argia | | | 5 9 5 3.7 | 0.341 F 0.000 F 0.000 F 0.000 F 2.357 F 0.000 F | Predators Predators Predators Predators Predators |
| 4 | Ddonata-Zygopiera | Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae | | | | 5 9 5 3.7 6.1 5.1 | 0.341 F 0.000 F 0.000 F 0.000 F 2.357 F 0.000 F | Predators Predators Predators Predators Predators |
| 4 6 5 30 | Odonata-Zygoptera | Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae | Argia | | | 5 9 5 3.7 6.1 5.1 9 | 0.341 F 0.000 F 0.000 F 0.000 F 2.357 F 0.000 F | Predators Predators Predators Predators Predators Predators |
| 4 6 5 30 | Odonata-Zygoptera | Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae | Argia | | | 5 9 5 3.7 6.1 5,1 9 | 0.341 F 0.000 F 0.000 F 2.357 F 0.000 F 0.000 F | Predators Predators Predators Predators Predators Predators Predators |
| 4 6 5 30 | Odonata-Zygoptera Diptera | Cordulegastridae Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae | Argia | | 34 | 5 9 5 3.7 6.1 5.1 9 9 | 0.341 F 0.000 F 0.000 F 0.000 F 2.357 F 0.000 F 0.000 F 0.000 F | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
| 4 6 5 30 | Odonata-Zygoptera | Cordulegastridee Cordulidae Libellulidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae Lestidae | Argia | | 34 | 5 9 5 3.7 6.1 5 1 9 9 9 5.7 8.1 | 0.341 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F | Predators Predators Predators Predators Predators Predators Predators Predators Pathers Pathers |
| 4 6 5 30 | Odonata-Zygoptera Diptera | Cordulegastridae Cordulidae Libellulidae Libellulidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenadronidae Coenadronidae Lestidae Certatopogonidae Blood-red Chironomidae | Argia | | 34 | 5 9 5 3.7 6.1 5.1 9 9 5.7 8.1 6 | 0.341 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F 0.000 F | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Sathers Sathers |
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| TAXA RICHNESS FBI | 15 5.965 | |
|--------------------------------|-------------|----------------------------|
| Scraper/Filter | #DIV/0! | Scraper = 15 / Filter = 0 |
| EPT/Chironomidae | 1.000 | estaper = 10 / / table = 0 |
| % Contribution of Dominant Tax | n 0.340 | |
| EPT Index | 1.000 | |
| Community Similarity Indices | 0.600 | Comm. Loss = 0.600 |
| | 0.208 | Jaccard Coef = 0.208 |
| CPOM | 0.020 | |
| Total Number Collected | 100 | |

total shredders

| STREAM NAI STATION #_ LAT STORET # COLLECTED TAXONOMIS | ME Bio | Creek | | | | | I LOCATION | Water Tax | K HU | | | | 1 |
|--|----------------|-------------|--|--|--|----------|------------------|---------------------|----------|--------------|----------|--|-----|
| LATSTORET# | | | DIL | | | | | | <u> </u> | | | | 4 |
| STORET # COLLECTED | | | | ERMI | LE | | STREAM CI | | | | | | _ |
| COLLECTED | | | LON | IG | | | RIVER BAS | IN | | | | | _ |
| TAXONOMIS | | | | | | , | AGENCY | | | | | |] |
| TAXONOMIS | BY €) F | 3 wa | ۷ | DA' | LE 10 | 13/a | LOT# | | | | | | |
| | TESB | wal | | DA' | ΓE | | SUBSAMPL | E TARGET 🗅 100 | 200 | 300 □ | Other | |] |
| | | Ente | r Fam | ily an | d/or G | enus an | d Species name | on blank line. | | | | | _ |
| Oı | rganisms | | No. | LS | TI | TCR | 0 | rganisms | No | LS | TI | TCR | |
| Oligochaeta | min | | 15 | A | un | | Megaloptera | | | | <u> </u> | <u> </u> | 1 |
| | | | | 1 | - | | 01 / /2 | 1111 4 | - · | | | <u> </u> | |
| Hirudinea , | <u> </u> | | ├— | ļ | | - | Colcoptersaria | 1111 | 3) 1 | I | wel | <u> </u> | 140 |
| Isopoda | <u> </u> | | | - | ├ | - | Deema | 11 C | 2) 2 | [A | Ubl | - | -D. |
| isopoda | | ····· | <u> </u> | | - | 1,4 | | | | + | | <u> </u> | ł |
| Amphipoda | | | | | | | Diptera Bkl Red | HATHUM. | runteri | 1127 | WEL | | 27 |
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| Decapoda | | | | | T | | | IVI C | 2) 1 | I | | | ۳ |
| • | | | | | | | Citien | - C | | +- | wbL | 1, | ł |
| Ephemeroptera | | <i>y</i> * | | n. | - | | | | | + | | | |
| Canidae | 1111 | (3) | A | F | 41 | | Gastropoda/_H | 11 - 01/-2 | 0/ | A | V6L | | |
| | | | • | | 7 | | RH | 11 - Pilyada | 70 - | A | | \ | |
| | | | | i | | \Box | | - Gania | 20 7 | + - | WEL | ' | |
| | | | | | | | Pelecypods Asw | Thu I C | | A | | | |
| Plecoptera | | | - | | | | 1 ciccypoda 1944 | THE C | 6)8 | 1+ | 466 | 1 | |
| riccopicia | | | | | | | • | · | | - | | | |
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| | | | | <u> </u> | | | phranin | 1 (| DIX | A | 466 | 1 | l |
| | | | | | | | horsehair | | 2) 7 | ' A | 266 | • | |
| Frichopt e ra | | | | | | • | Odonata | 1 | DX | Ŧ | 466 | (| |
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| lemiptera . | | | | | | | | | | | | | İ |
| Water Strider | HKIII | 3 | 8 | 4 | υll | | | | | | | | |
| | mba madin — AT | CD) 1 5:1 | | | لــا | | . 10 | 5, give reason (e.g | | | | | ! |

Total No. Taxa

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME | | | | | | | | | | | | | | | | | _ |
|--|----------------------------|---------------------------------------|---|---|---|--|---|---|---|--------------------------------------|---|---|-----------------|---------------------|---------------|----------------|--------|
| | کے تص | (| _رو | eK | | LOCATION | 1 Was | ter | 77 | ink | 7 | d | | | | | |
| STATION# 4 | - | , | RMI | LE_ | | STREAM C | LASS | | | | | | | | | | |
| LAT | | NG | _ | | | RIVER BAS | SIN | | | | | | | | | | |
| STORET # | | | | | | AGENCY | | | | | | | | | | | |
| INVESTIGATORS | W | G.L | 4 | R | 5 | | | | | L | 1 TO | IUMBER | | | | | |
| FORM COMPLETED | RV | | `` | | - , | DATE 10 | /13/0 | 4 | | R | EAS | ON FOR SURVEY | | | | | |
| FORWI COMI EETEL | | E. | B | | | TIME II | | _ | PM | " | | | | | | | |
| | | | | | | <u> </u> | | _ | | | | | | | | | |
| HABITAT TYPES | In | dica Cob Subi | te th ble_ merg | e per 10 ged M | rcent % lacro | age of each habitat Snags % phytes 5 % | type pr | esei egeti | nt ated | Bank ther (| cs_ <u>\$</u> | % | <u>%</u> | | | | |
| SAMPLE | G | ear ı | ısed | T. | D-fra | me 🛭 kick-net | I | 0 | ther | | | · · · · · · · · · · · · · · · · · · · | _ | | | | |
| COLLECTION | II. | | | • | | les collected? | | | | fron | ı ban | k 🚨 from bo | at | | | | |
| | l | | | | | | | | | | | | | | | | |
| | | | | le nu | | r of jabs/kicks take | n in eac ZiV | h ha eget: | ibita ated | t typ Banl | e. cs | Sand | 0 | | | | |
| | 7 | Sub | merg | ed N | lacro | phytes_10_ | | | ۵o | ther | | | | | | | |
| GENERAL COMMENTS | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| QUALITATIVE I Indicate estimated Periphyton Filamentous Algae | abu | INC ands | G O | F A | QUA = A 0 0 | ATIC BIOTA bsent/Not Observ | | Slir | | | | · ···································· | ant, | 4 = 1) 1 1 | 00m 2 Q | ina: 3 3 | 4 4 |
| Macrophytes | | | | | 0 | 1 2 3 4 | | | | | | | | | | _ | |
| * * | | | | | | | | Fisl | | | | | 0 | (3) | W | 3 | 4 |
| EXELD OBSEDA | | | | | | | | Fisl | | ·ové | | Sunfiel | . 0 | | كإ | 3 | 4 |
| | | | | | | OBENTHOS | | • | | | Jear | | | (| | 3 | 4 |
| Indicate estimated | | | | : | 0 = 2 | Absent/Not Obser | rved, 1 | = I | ے Rare | (1- | sor | ganisms), 2 = Cor | | | | 3_ | 4 |
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| Indicate estimated | abu | ında | ince | : | 0 = 1 orgs | Absent/Not Obsernisms), 3= Abun | rved, 1 dant (> | = F ·10 · | Z Rare orga | (1-: inisi | 3 or | ganisms), 2 = Cor 4 = Dominant (>: | 50 or | gan | sms | - | 4 |
| Indicate estimated | abu 0 | | 2 | 3 | 0 = 2 orgs 4 | Absent/Not Obser nisms), 3= Abun Anisoptera | rved, 1 dant (> | = I | Rare orga | (1-: inisi | sor | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae | 50 or 0 | | sms 2 | 3 | 4 4 |
| Indicate estimated Porifera Hydrozoa | abu | nds | 2 2 | 3 3 | 0 = 1 orgs | Absent/Not Obser nisms), 3= Abun Anisoptera Zygoptera | rved, 1 dant (> | = F 10 | Z Rare orga | (1-: inisi | 3 or; ms), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera | 50 or | gani 1 | sms | - | |
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| Porifera Hydrozoa Platyhelminthes | 0 0 0 | 1 1 1 | 2 2 2 | 3 3 3 | 0 = 4 4 4 | Absent/Not Obser inisms), 3= Abun Anisoptera Zygoptera Hemiptera | o 0 | = I 1 1 1 | Rare orga | 3 3 3 | 3 or ms), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |
| Porifera Hydrozoa Platyhelminthes Turbellaria | 0 0 0 0 | 1 1 1 1 | 2 2 2 2 | 3 3 3 3 | 0 = 4 orga 4 4 4 4 | Absent/Not Obser inisms), 3= Abundanisoptera Anisoptera Zygoptera Hemiptera Coleoptera | o 0 0 0 | = I 1 1 1 1 | Rare orga | 3 3 3 3 | 3 or ms), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |
| Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea | 0 0 0 0 | 1 1 1 1 | 2 2 2 2 2 2 | 3 3 3 3 3 | 0 = 4 0rgs 4 4 4 4 4 | Absent/Not Observinisms), 3= Abundanisms), 0 0 0 0 0 | 1 1 1 1 1 | Rare orga | 3 3 3 3 3 | 3 orms), 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |
| Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta | 0 0 0 0 0 | 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 | 0 = 1 orga 4 4 4 4 4 4 | Absent/Not Obser Inisms), 3= Abundanisms), 0 0 0 0 0 0 | 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 | 3 orms), 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |
| Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda | 0 0 0 0 0 | 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 3 | 0 = 4 4 4 4 4 4 4 | Absent/Not Observinisms), 3= Abundanisms), 0 0 0 0 0 0 | 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 | 3 orr 3 orms), 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |
| Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda | 0 0 0 0 0 0 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 | 4 4 4 4 4 4 4 4 | Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae Empididae Simuliidae | o 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 | 3 or ms), 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |
| Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda | 0 0 0 0 0 0 | 1 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 3 | 0 = 1 4 4 4 4 4 4 4 4 4 4 4 4 | Absent/Not Observinisms), 3= Abundanisms), 0 0 0 0 0 0 0 0 | = I 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 | 3 orms), 4 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 | gani 1 1 1 | 2 2 2 | 3 3 3 | 4 |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

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| - 1. A. | |
| | |
| To Santa | |
| Salv. | |

| STREAM NAME Bia Creek | LOCATION Water Tank Rd |
|------------------------|---------------------------------|
| STATION # 4 RIVERMILE | STREAM CLASS |
| LAT LONG | RIVER BASIN |
| STORET# | AGENCY |
| INVESTIGATORS ESB, WGC | |
| FORM COMPLETED BY ES | DATE 10/13/04 REASON FOR SURVEY |

| | WEATHER CONDITIONS | Now | storm (heavy rain) rain (steady rain) showers (intermittent) %cloud cover clear/sunny | Past 24 hours □ □ □ □ □ □ □ □ | Has there been a h Yes □ No Air Temperature_ Other | | last 7 days? |
|---|----------------------------|---|---|--------------------------------|---|--------------------------|--------------|
| DELB Dept | | DECB | of the site and indicat | Lebity | mpled (or attach a ph | Death(A) | Yelocity (|
| 1.0 0.8 20 1.3 3.0 1.4 4.0 1.4 | 0.07 | 0 - ka | 1.0 1.7 2.0 1.9 | 0.07 | 1.0 2.0 3.0 | 1.6 1.9 | 0.08 |
| 5.0 1.3 6.0 1.6 7.0 1.6 8.0 1.6 | 0.12 | 3.5 3.5 4.0 | 1.8 1.8 1.9 | 0.00 | 4.0 5.0 6.0 7.0 | 2.0 2.0 1.9 1.9 | 0.05 |
| 9.0 1.6 10.0 1.5 11.0 0.8 12.0 0.5 | 0.06 | 4.5 5.0 5.5 6.0 | 7.0 1.9 1.9 | 0.09 | 8.0 9.0 10.0 | 1.9 1.2 0.2 RB | 0.09 |
| 13.0 0.3 14.0 RB | | 6.5 7.0 7.5 8.0 | 3.0 3.0 3.0 | 0.09 0.08 0.08 0.05 | | | · |
| | | 8.5 9.0 9.5 10.0 | 1.8 1.5 1.2 0.8 | 0.06 | | | |
| | | 11.0 | O.Y RB | 0.05 | | | |
| | STREAM CHARACTERIZATION | Stream Sub Perennial Stream Orl Glacial Non-glaci | gin U Spring ial montane | g-fed re of origins | Stream Type Coldwater Catchment Area | Warmwater km² | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSHED | Predominant Surrounding Landuse | Local Watershed NPS Pollution No evidence Some potential sources |
|---|--|---|
| FEATURES | ☐ Forest ☐ Commercial ☐ Field/Pasture ☐ Industrial | Obvious sources |
| | Agricultural Other | Local Watershed Erosion None |
| RIPARIAN VEGETATION (18 meter buffer) | Indicate the dominant type and record the domin | |
| | | |
| INSTREAM FEATURES | Estimated Reach Length m Estimated Stream Width m | Canopy Cover Partly open Partly shaded Shaded High Water Mark |
| | Sampling Reach Aream² | |
| | Area in km² (m²x1000)km² | Proportion of Reach Represented by Stream Morphology Types Riffle 3 % Run 8 % |
| , * - | Estimated Stream Depth5 m | |
| | Surface Velocitym/sec | Channelized Yes O No |
| | (at thatweg) | Dam Present 🖸 Yes 🔑 No |
| LARGE WOODY DEBRIS | LWDm² | t) |
| | Density of LWDm²/km² (LWD/ reac | n area) |
| AQUATIC VEGETATION | Indicate the dominant type and record the dominant Rooted emergent | nant species present □ Rooted floating □ Free floating |
| | dominant species presentFlame nto | us Algoe |
| | Portion of the reach with aquatic vegetation | J |
| WATER QUALITY | Temperature 61 08 = 16.1°C | Water Odors |
| | Specific Conductance 409 mhos | Normal/None |
| | Dissolved Oxygen 8,78 ma/L | ☐ Fishy ☐ Other |
| | pH 7.43 | Water Surface Oils ☐ Slick ☐ Sheen ☐ Globs ☐ Flecks ☐ None ☐ Other |
| | Turbidity 20 | Turbidity (if not measured) |
| | WQ Instrument Used Troll 9000 LaMethe ORP = +306 | ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other |
| SEDIMENT/ SUBSTRATE | Odors Normal Sewage Petroleum Chemical Anaerobic None | Deposits ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relict shells ☐ Other |
| | Oil Absent 🗆 Slight 🗅 Moderate 🗀 Profuse | Looking at stones which are not deeply embedded, are the undersides black in color? |
| | | |

| INC | RGANIC SUBSTRATE (should add up to 1 | | ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%) | | | |
|-------------------|--------------------------------------|------------------------------------|--|----------------------------|-----------------------------------|--|
| Substrate Type | Diameter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | |
| Bedrock | | • | Detritus | sticks, wood, coarse plant | 7 | |
| Boulder | > 256 mm (10") | 5 |] | materials (CPOM) | <u> </u> | |
| Cobble . | 64-256 mm (2.5"-10") | 10 | Muck-Mud | black, very fine organic | | |
| Gravel | 2-64 mm (0.1"-2.5") | 35 | | (FPOM) | | |
| Sand | 0.06-2mm (gritty) | 30 | Marl | grey, shell fragments | | |
| Silt | 0.004-0.06 mm | 20 | | | 2 | |
| Clay | < 0.004 mm (slick) | 10 | | | • | |

A-6

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| LOCATION Water To | K RG |
|-----------------------------------|----------------------------------|
| STREAM CLASS | |
| RIVER BASIN | |
| AGENCY | |
| | |
| DATE 10/13/04 TIME 11:00 AM PM | REASON FOR SURVEY |
| | RIVER BASIN AGENCY DATE 10(15/04 |

| | Habitat | | Condition | Category | |
|------------|--------------------------------------|---|---|---|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| Sub | pifaunal strate/ silable Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat obvious; substrate unstable or lacking. |
| sco | ORE 8 | 205619 e483417 (16 | 12 02 312 (22 00 | | |
| | Pool Substrate aracterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat o vegetation. |
| sc | ore 8 | 20 210/238 (2023) | | | |
| 3. I | Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools smal shallow or pools abser |
| SC | ORE 13 | Z68/49. "18Wein, als | | | A section of |
| 4. S De | Sediment position | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased ba development; more the 80% of the bottom changing frequently; pools almost absent d to substantial sedimer deposition. |
| sc | CORE 8 | 20: 19: 18: 17: 16 | p\$2014 FeRS 812 SEE | | |
| | Channel Flow atus | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | Very little water in channel and mostly present as standing pools. |
| sc | CORE 14 | 20 10 10 10 18 17 18 16 | 515 (0.01) 12 51 | 10 9 9 8 3 2 7 7 7 | 5 (4.23.22.1) |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| - | Habitat | | Condition | Category | |
|--|--|--|---|---|---|
| l | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely. |
| | SCORE | 20 - d9 - 18 17 16 | alsocia costade (nd | 10 9 8 7 6 | 5 4 8 200 0 |
| Jung reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| Sam | score 3 | 201981819116 | e150 (4) (43°, 12, 11. | 10 9 8 49 36. | \$244 (4) \$150 S |
| rarameters to be evaluated broader than sampling reach | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars. |
| 7 W I | SCORE (LB) | Left Bank & 10 9 | 85 . 9 | 543 | |
| De e | SCORE _ (RB) | Right Bank 4 % 10 - 9 5 | 8 1 7 7 6 1 | 3 - 4 - 3 | |
| rarameters to | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one- | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambani vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| | | minimal or not evident; almost all plants allowed to grow naturally. | half of the potential plant stubble height remaining. | | |
| | SCORE (LB) | Left Bank 10 9 | 8, 1, 7, 1, 6, | 制度的现在分词 | 2 1 |
| | SCORE <u>U</u> (RB) | Right Bank = 510 49 | 8 \$ 72 5 6 | | 2, 1775.00 |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of riparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE (LB) | Left Bank | 8 6 7 4 6 | 5 4 73 5 | 2.4 |
| | SCORE! (RB) | Right Bank = 30 9 | - 8 - 1 7 m - 16 - 1 | 5 - 4 3 6 | 24001201 |

Total Score 77

| | h . 1 | _ | |
|--|-------|-------|-----------|
| | 12 | | Λ |

Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 47

| River Code: RM: | | | | |
|--|--|--|--|---|
| Kivel Code. | Stream:Bia | | | |
| Date: 10/13/04 Location | n: Water Tank F | ld Station 4 | | |
| Scorers Full Name: Ed Belmonte | Affiliation: |) | | |
| 1] SUBSTRATE (Check ONLY Two Su | ubstrateTYPE BOXES; Estim | nate % present | | |
| TYPE POOL RIFFLE | POOL RIFFLE SL | JBSTRATE ORIGIN | SUBSTRATE QUALITY | |
| | RAVEL [7]Check | ONE (OR 2 & AVERAGE) | Check ONE (OR 2 & AVERAGE) |) |
| | AND [6] 20 20 0. | LIMESTONE [1] SILT: | _ SILT HEAVY [-2] | Cub strata |
| | EDROCK[5] | TILLS [1] | Pa -SICI MODELOVIE [-1] | Substrate |
| | ETRITUS[3] To | WETLANDS[0] | -SILT NORMAL [0] | |
| □ □-MUCK [2] □ □ □-AF | | HARDPAN [0] | | |
| | oint Sources | SANDSTONE [0] EMBEDDE | | Max 20 |
| | | RIP/RAP [0] NESS: | MODERATE [-1] | |
| | | LACUSTRINE [0] | O-NORMAL [0] | |
| (High Quality Only, Score 5 or >)3 | | SHALE [-1] | -NONE [1] | |
| COMMENTS | | COAL FINES [-2] | AMOUNT /Obsels ONLY One | · |
| 2] INSTREAM COVER (Give each co | ver type a score of 0 to 3; se PE: Score All That Occur | ee back for instructions) | AMOUNT: (Check ONLY One of | Cover |
| (Oli dolaro) | | OVDOVEC BACKWATERS [4] | check 2 and AVERAGE) - EXTENSIVE > 75% [11] | |
| UNDERCUT BANKS [1] | POOLS> 70 cm [2] | OXBOWS, BACKWATERS [1] AQUATIC MACROPHYTES [1] | - MODERATE 25-75% [7] | 11911 |
| OVERHANGING VEGETATION [1] | | _AQUATIC MACROPHTTES [1] _LOGS OR WOODY DEBRIS [1] | - SPARSE 5-25% [3] | Max 20 |
| SHALLOWS (IN SLOW WATER) [1] | ∠BOULDERS [1] | FOGS OK MOOD! DEBKIS [1] | - NEARLY ABSENT < 5%[1] | Wax 20 |
| ROOTMATS [1] COMMENTS: 3] CHANNEL MORPHOLOGY: (Check | MIV One PER Categor | OR check 2 and AVERAGE | | |
| • | | TABILITY MODIFICATI | ONS/OTHER | Channel |
| SINUOSITY DEVELOPMENT - HIGH [4] D - EXCELLENT [7] | | I - HIGH [3] | | |
| - MODERATE [3] - GOOD [5] | | I - MODERATE [2] □ - RELOCA | | $\parallel 7 \parallel$ |
| LOW [2] | | | REMOVAL 🗖 - LEVEED | Max 20 |
| D- NONE [1] POOR [1] | EI - RECENT OR NO | 🗖 - DREDGI | NG 🗖 - BANK SHAPING | |
| The state of the s | RECOVERY [1] | - ONE SIL | E CHANNEL MODIFICATIONS | |
| COMMENTS: | | | | |
| 4]. RIPARIAN ZONE AND BANK ERO | | | | Downstream I |
| RIPARIAN WIDTH | FLOOD PLAIN QUALIT | <u>Y (PAST 100 Meter RIPARIAN</u> | | Riparian |
| - · · · · · · · · · · · · · · · · · · · | t Predominant Per Bank) | L R | L R (Per Bank) | |
| | EST, SWAMP [3] | CONSERVATION TILLAGE | [1] D-NONE/LITTLE [3] | . () () |
| MONEDATE 40 E0 [2] III III.CHDI. | | | | ı 3 |
| | JB OR OLD FIELD [2] | □ □ -URBAN OR INDUSTRIAL | [0] -MODERATE [2] | |
| □ □ NARROW 5-10 m [2] □ □-RESI | DENTIAL, PARK, NEW FIELD [1] | U -URBAN OR INDUSTRIAL OPEN PASTURE, ROWCE | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1 | |
| NARROW 5-10 m [2] | | □ □ -URBAN OR INDUSTRIAL | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1 | |
| HID- NARROW 5-10 m [2] HID-RESIL | DENTIAL, PARK, NEW FIELD [1] | U -URBAN OR INDUSTRIAL OPEN PASTURE, ROWCE | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1 | |
| NARROW 5-10 m [2] | DENTIAL, PARK, NEW FIELD [1] | U -URBAN OR INDUSTRIAL OPEN PASTURE, ROWCE | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1 | |
| VERY NARROW <5 m[1] G -FEN | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] | U -URBAN OR INDUSTRIAL OPEN PASTURE, ROWCE | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1 | 13Max 10 |
| VERY NARROW <5 m[1] G G-FENG OFFICE OF THE PROPERTY OF THE PR | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY | U - URBAN OR INDUSTRIAL D-OPEN PASTURE, ROWCH D - MINING/CONSTRUCTIO | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1 | Max 10 |
| VERY NARROW 5-10 m [2] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY | U-URBAN OR INDUSTRIAL D-OPEN PASTURE, ROWCH D-MINING/CONSTRUCTIO | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] | 13Max 10 |
| DI NARROW 5-10 m [2] D-RESID VERY NARROW <5 m[1] D D-FENDER OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF THE NAME OF T | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) | URBAN OR INDUSTRIAL DE-OPEN PASTURE, ROWCE DE-MINING/CONSTRUCTIO CURRENT VELOCIT (Check All | [0] -MODERATE [2] OP [0] ET ET-HEAVY/SEVERE[1 N [0] Y [POOLS & RIFFLES!] That Apply) | Max 10 |
| DI NARROW 5-10 m [2] DI RESIL VERY NARROW <5 m[1] DI FEN ONE NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QU MAX. DEPTH (Check 1 ONLY!) ONE NONE (Check ONLY!) ONLY! | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] | CURRENT VELOCIT (Check All | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] | Max 10 Pool/ |
| DI NARROW 5-10 m [2] DI RESIL VERY NARROW <5 m[1] DI FEN ONE NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QU MAX. DEPTH MOR! (Check 1 ONLY!) (Check 1 - >1m [6] POOL WID 0 - 0.7-1m [4] DI POOL WID | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH = RIFFLE WIDTH [1] | CURRENT VELOCIT (Check All -EDDIES[1] -FAST[1] | [0] -MODERATE [2] OP [0] ET ET-HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] | Max 10 |
| DI NARROW 5-10 m [2] DI RESIL VERY NARROW <5 m[1] DI FEN OI - NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QU MAX. DEPTH MORI (Check 1 ONLY!) (Check - >1m [6] POOL WID - 0.7-1m [4] POOL WID - 0.4-0.7m [2] DI-POOL WID | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] | CURRENT VELOCIT (Check All -FAST[1] -MODERATE [1] | [0] -MODERATE [2] OP [0] ET ET-HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] | 1]Max 10 |
| DI NARROW 5-10 m [2] DI RESIL VERY NARROW <5 m[1] DI FEN ONE NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QU MAX. DEPTH MOR! (Check 1 ONLY!) (Check 1 - >1m [6] POOL WID 0 - 0.7-1m [4] DI POOL WID | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE W. [0] | CURRENT VELOCIT (Check All -FAST[1] -MODERATE [1] | [0] -MODERATE [2] OP [0] ET GI-HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] -INTERMITTENT[-2] | 1]Max 10 |
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| DI - NARROW 5-10 m [2] D-RESID - VERY NARROW <5 m[1] D D-FEND - NONE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QUAX. DEPTH MORI (Check 1 ONLY!) (Check 1 ONLY!) D- >1m [6] POOL WID D-0.4-0.7m [2] D-POOL WID D-0.2-0.4m [1] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE W. [0] | CURRENT VELOCIT (Check All -FAST[1] -MODERATE [1] -MODERATE [1] -CHECK 2 AND AVERAGE | [0] A-MODERATE [2] OP [0] ET G-HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] -INTERMITTENT[-2] -VERY FAST[1] | Max 10 |
| NARROW 5-10 m [2] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE WIDTH [1] OTH < RIFFLE W. [0] CHECK ONE OR COLUMNIA | CHECK 2 AND AVERAGE O -URBAN OR INDUSTRIAL CURRENT VELOCIT (Check All -EDDIES[1] -MODERATE [1] CHECK 2 AND AVERAGE (RUN SUBSTRATE R | [0] A-MODERATE [2] OP [0] ET G-HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSITIAL[-1] -INTERMITTENT[-2] -VERY FAST[1] IFFLE/RUN EMBEDDEDNESS | Pool/ Current Max 12 |
| NARROW 5-10 m [2] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE WIDTH [1] OTH < RIFFLE W. [0] CHECK ONE OR COLUMN COLUMN | CHECK 2 AND AVERAGE (e.g.,Cobble, Boulder) [2] | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] -INTERMITTENT[-2] -VERY FAST[1] IFFLE/RUN_EMBEDDEDNESS -NONE [2] | Pool/ Current Max 12 |
| NARROW 5-10 m [2] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE WIDTH [1] OTH < RIFFLE W. [0] CHECK ONE OR COLUMN CHECK ONE OR COLUMN MAX > 50 [2] | CURRENT VELOCIT (Check All -FAST[1] -MODERATE [1] -MODERATE [1] -SLOW [1] CHECK 2 AND AVERAGE (RUN SUBSTRATE R (e.g.,Cobble, Boulder) [2] TABLE (e.g.,Large Gravel) [1 | [0] | Pool/ Current Max 12 Riffle/Run Max 8 |
| NARROW 5-10 m [2] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE WIDTH [1] OTH < RIFFLE W. [0] CHECK ONE OR COLUMN CHECK ONE OR COLUMN MAX > 50 [2] | CHECK 2 AND AVERAGE (e.g.,Cobble, Boulder) [2] | OP [0] In -MODERATE [2] OP [0] In -HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] -INTERMITTENT[-2] -VERY FAST[1] IFFLE/RUN_EMBEDDEDNESS In NONE [2] In LOW [1] In MODERATE [0] | Pool/ Current Max 12 |
| DI NARROW 5-10 m [2] D-RESIL VERY NARROW <5 m[1] D-FEN ONNE [0] COMMENTS: 5.]POOL/GLIDE AND RIFFLE/RUN QI MAX. DEPTH MOR! (Check 1 ONLY!) (Check - >1m [6] - POOL WID - 0.7-1m [4] D-POOL WID - 0.2- 0.4m [1] - < 0.2m [POOL=0] COMMENTS: RIFFLE DEPTH RUN - Best Areas >10 cm [2] - Best Areas 5-10 cm [1] | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE WIDTH [1] OTH < RIFFLE W. [0] CHECK ONE OR COLUMN CHECK ONE OR COLUMN MAX > 50 [2] | CURRENT VELOCIT (Check All -FAST[1] -MODERATE [1] -MODERATE [1] -SLOW [1] CHECK 2 AND AVERAGE (RUN SUBSTRATE (e.g.,Cobble, Boulder) [2] FABLE (e.g.,Large Gravel) [1 LE (Fine Gravel,Sand) [0] | [0] -MODERATE [2] OP [0] -HEAVY/SEVERE[1] N [0] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] -INTERMITTENT[-2] -VERY FAST[1] IFFLE/RUN EMBEDDEDNESS O NONE [2] O LOW [1] MODERATE [0] C EXTENSIVE [-1] | Pool/ Current Max 12 Riffle/Run Max 8 |
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| DI NARROW 5-10 m [2] D-RESIDE VERY NARROW <5 m[1] D-FENDE OF PROPERTY OF THE P | DENTIAL, PARK, NEW FIELD [1] CED PASTURE [1] UALITY PHOLOGY 1 or 2 & AVERAGE) OTH > RIFFLE WIDTH [2] OTH < RIFFLE WIDTH [1] OTH < RIFFLE W. [0] CHECK ONE OR COLUMN CHECK ONE OR COLUMN MAX > 50 [2] | CURRENT VELOCIT (Check All -FAST[1] -MODERATE [1] -MODERATE [1] -SLOW [1] CHECK 2 AND AVERAGE (RUN SUBSTRATE R (e.g.,Cobble, Boulder) [2] TABLE (e.g.,Large Gravel) [1] LE (Fine Gravel,Sand) [0] | [0] A-MODERATE [2] OP [0] D -HEAVY/SEVERE[1] Y [POOLS & RIFFLES!] That Apply) -TORRENTIAL[-1] -INTERSTITIAL[-1] -INTERMITTENT[-2] -VERY FAST[1] IFFLE/RUN_EMBEDDEDNESS O NONE [2] O LOW [1] A-MODERATE [0] O EXTENSIVE [-1] [Metric=0] | Pool/ Current Max 12 Riffle/Run Max 8 Gradient |

Vial#

Macrobenthos Qualitative Sample List

| 21 | | | | 0050450 | COUNT | TOLEDANCE VALUES | TED: | |
|---|---|---|---|--|--|--|---|--|
| | | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | | D |
| | Nematomorpha | | | | | | | Parasite |
| L | Hydracarina- Trombidiformes | | | | | | | Predators/Parasite |
| | Tubellaria | Planaria | | | 1 | 4 | 0.044 | Omnivore |
| | Porifera | Spongillidae | | [· | | | 0.000 | Filters |
| | Pelecypoda | Corbiculidae | Corbicula | fluminea | 6 | 3.2 | 0.213 | Filters |
| 3' | Генсурхиа | | Dreissena | | | | 0.000 | |
| | į | Dreissenidae | | polymorpha | | | | |
| - 1 | | Unionidae | Villosa | iris | | | 0.000 | |
| 18 | | Sphaeridae | | | | 8 | 0.000 | |
| | Gastropoda | Ancylidae | | | | 6 | 0.000 | Scrapers |
| 20 | Guoriopoux | | | | 1 | 6.9 | 0.077 | Scrapers |
| 20 | | Lymnaeidae | F | | | | | |
| ı | | Lymnaeidae | Fossaria | | | 6 | | Scrapers |
| 19 | | Physidae | | | 1 | 8 | 0.089 | Scrapers |
| ı | | Physidae | Physella | | | В | 0.000 | Scrapers |
| - 1 | | Planorbidae | | | | 7 | 0.000 | Scrapers |
| - 1 | | Planorbidae | Planorbula | | | 7 | | Scrapers |
| - 1 | | | - MINOIDUM | | | | 0.000 | Scrapers |
| - 1 | | Pleuroceridae | | . | | | | |
| - 1 | | Bithyniidae | Bithynia | tentaculata | | | | Scrapers |
| - 1 | Annelida | Hirudinea | | | | 10 | | Gathers |
| 25 | | Oligochaeta | | | 10 | | 0.000 | Gathers |
| 26 | Decapoda | | | | | 8 | 0.000 | Predators |
| | Americand | | | | · · · · | 4 | | Shredders |
| | Amphipoda | | | | | | | |
| 24 | Isopoda | Aselidae | | | | 8 | | Shredders |
| | Ostracoda | | | | | 8 | 0.000 | Scavengers |
| l i | Ephemeroptera | Caenidae | | | l . | 7 | 0.000 | Gathers |
| 13 | | Caenidae | Caenis | | 3 | 3.1 | 0.103 | Gathers |
| | | Ephemeridae | Hexagenia | | | 3.6 | | Gathers |
| اء, | | | | | | 3.1 | | |
| 15 | | Baetidae | Baetis | harmania - t | | | 0.000 | Gathers |
| | | Baetidae | Baetis | brunneicolor | | 4 | 0.000 | Gathers |
| | | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| 1 | | Baetidae | Callibaetis | 1 | | 5.6 | 0.000 | Gathers |
| 14 | | Heptageniidae | Stenacron | | 1 | 3.1 | | Scrapers |
| | | | Stenacron | gildersleevei | 1 | 3.1 | | Scrapers |
| | - | Heptageniidae | | Simplomotol | | 4 | | |
| | <u> </u> | Heptageniidae | Stenonema | | | | | Scrapers |
| | | Heptageniidae | Stenonema | exiguum | | 1.9 | | Scrapers |
| | | Isonychiidae | Isonychia | | | 2 | | Filters |
| | | Leptohyphidae | Tricorythodes | | 1 | 2.7 | | Gathers |
| | | Siphionuridae | | 1 | T | 7 | | Gathers |
| | | Ephemerellidae | Timpanoan | | † | 1 | | Gathers |
| | | | Timpanoga | | - | | | |
| | | Leptophlebiidae | | | ļ | 2 | | Gathers |
| 8,9 | Coleoptera | Dytiscidae | | | . 2 | 5 | | Predators |
| 37 | 1 | Gyrinidae | | | l | 5 | | Predators |
| | | Gyrinidae | Dineutus | | | 3.7 | 0.000 | Predators |
| 27,33 | 1 | | | i | 3 | 7 | 0.233 | Predators |
| دد, ہے | | Haliplidae | | | | 5 | | Predators Predators |
| | | Dryopidae | | | | | | |
| 28,32 | | Elmidae | | | L | . 4 | | Gathers |
| | | Psephenidae | Psephenus | 1 | | 4 | 0.000 | Scrapers |
| | | Hydrophiloidae | | T | T | | 0.000 | Gathers |
| 7 | , | Hydrophiloidae | Tropisternus | | | İ | | Gathers |
| - 1 | Managemen | | Tiopisterras | | | 4 | 0.000 | Dradates |
| | Megaloptera | Sialidae | | | | | 0.000 | Predators |
| | | Corydalidae | Corydaius | | 1 | 4 | 0.000 | Predators |
| | Trichoptera | Brachycentridae | Brachycentrus | I | 1 | j. 1 | 0.000 | Fitters |
| | | Helicopsychidae | Helicopsyche | | | 3 | 0.000 | Scrapers |
| | | Helicopsychidae | Helicopsyche | borealis | | 3 | | Scrapers |
| 16 | | | | | | 4 | | Filters |
| 10 | | Hydropsychidae | 11 | | | 4 | | |
| | | Hydropsychidae | Hydropsyche | | | | | Filters |
| | | 1Hydropsychidae | Hydropsyche | betteni | | 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | scalaris | | 4 | 0.000 | Filters |
| | | Hydropsychidae | Symphitopsyche | | | 4 | 0.000 | Filters |
| | | Hydroptilidae | | | | 4 | | Gathers |
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| | — | Hydroptilidae | Hydroptila | | | 3.2 | 0.000 | Gathers |
| | | Leptoceridae | | | | 4 | | Shredders |
| | | Leptoceridae | Nectopsyche | | | 4 | 0.000 | Shredders |
| | | Molannidae | | 1 | 1 | 6 | 0.000 | Gathers |
| | | Philopotamidae | 1 | 1 | 1 | 3 | 0.000 | Filters |
| | | | Hacenelle | | - | 4 | | |
| | <u> </u> | Phryganeidae | Hagenella | 1 | + | | | Shredders |
| | <u> </u> | Polycentropodidae | Cymelius | 1 | + | 6 | | Filters |
| | | Psychomyiidae | Lype | | | 2 | | Gathers |
| 36 | Hemiptera | Belostomatidae | | | | | 0.000 | Predators |
| | | Belostomatidae | Belostoma | | | | 0.000 | Predators |
| | | Corixidae | · · · · · · · · · · · · · · · · · · · | | l . | 10 | 0.000 | Predators |
| 34 | | | 1 | t | | 5 | | Predators |
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| 34 | Odonata-Anisoptera | Gerridae Netonectidae Nepidae Nepidae Perridae Perridae Choroperidae Aestradae Gomphidae Cordulegastridae Cordulegastridae | Notonecta Ranatra Periesta | | 1 | 1 1 1 3 3 3 1 1 3 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
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FBI
Scraper/Filter
EPT/Chironomidae
% Contribution of Dominant Taxe
EPT Index
Community Similarity Indices 14 6.250 0.333 0.061 0.270 1.000 0.714 0.167 0.040

Comm. Loss = 0.714 Jaccard Coef. = 0.167

CPOM Total Number Collected

total shredders

4

BENTHIC MACROINVERTEBRATE LABORATORY BENCH SHEET (FRONT)

| | | pageof |
|-----------------------|---------------|--|
| STREAM NAME Bia Cree | K | LOCATION Emac Rd Bridge |
| STATION# | RIVERMILE | STREAM CLASS |
| LATI | ONG | RIVER BASIN |
| STORET# | | AGENCY |
| COLLECTED BY ESB, WGL | DATE 10/12/04 | LOT# |
| TAXONOMIST ESB, WGL | DATE | SUBSAMPLE TARGET □ 100 □ 200 □ 300 □ Other |

| O | rganisms | | No. | LS | TI | TCR | 0 | rganisms | No. | LS | TI | TCR | |
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| onomic certai | nty rating (To | CR) J-5:1 | =most | certain | <i>w6L</i> 5=1ea | / st certs | ain. If rating is 3- | 5, give reason (e.g., mis | eina a | ile) T | C= 146- | ateas | |

Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition - Form 3

BENTHIC MACROINVERTEBRATE FIELD DATA SHEET

| STREAM NAME | id | | <u> </u> | <u>K</u> _ | | LOCATION | Er | Mac | <u> </u> | 14 | <u> </u> | | | | | | _ |
|---|---|--------------------------------------|---|---|---|---|---|--|---------------------------------|--|-----------------------------|---|------------------------------|--------------|--------------------------|----------------------------|----------|
| STATION # | RIV | /ER | MIL | .E | | STREAM CLA | | | | | | | | | | | _ |
| LAT | LO | NG. | | | | RIVER BASIN | 1 | | | | | | | | | | \sqcup |
| STORET# | | | | | | AGENCY | | | | | | | | | | | |
| INVESTIGATORS | E۵ | \mathcal{B} | u | 10 | -ر | | | | | LC | 1 TC | IUMBER | | | | | |
| FORM COMPLETED | BY | E | ر | 5 | | DATE 10/1: TIME 14:0 | | / / | M | RI | EAS | ON FOR SURVEY | | | | | |
| HABITAT TYPES | Z C | obb | ole 🕳 | <u> </u> | % | age of each habitat ty Snags 2 % phytes 2 % | pe pr | getat | ted E | Bank her (| <u>.5</u> | % | % _% | | | | |
| SAMPLE COLLECTION | İ | | | Į. | | me 🛘 kick-net | , | Otl | ner_ | | | | - | | | | |
| How were the samples collected? wading G from bank G from boat | | | | | | | | | | | | | | | | | |
| • | Indicate the number of labs/kicks taken in each habitat type. Cobble \(\sum_{\text{o}} \) Snags \(\sum_{\text{o}} \) Vegetated Banks \(\text{lO} \) Submerged Macrophytes \(\frac{10}{20} \) Other (\qquad) | | | | | | | | | | | | | | | | |
| GENERAL COMMENTS | | | ÷ | | | · | | | | | | | | | | | |
| | | | | | | | | | | | | • | | | | | - |
| QUALITATIVE L | ISTI | NG | : O | F A | QU/ | TIC BIOTA | | | | | | . 4 | | | | | |
| Indicate estimated | abuı | nda | nce | : 0 | = A | bsent/Not Observed | | Ra Slim | _ | 2 = | Co | mmon, 3= Abund | ant, | 1 = I | Dom | ina : | nt 4 |
| Indicate estimated Periphyton | abui | nda | nce | : 0 | = A | bsent/Not Observe | | | es | | | · | |) 1 (1) | | | |
| Indicate estimated | abui | nda | nce | : 0 | = A | bsent/Not Observed | ; | Slim | es roin | | | · | 0 | 1 = 1 | 2 | 3 | 4 |
| Periphyton Filamentous Algae | abui | nda | OF | : 0 MA | 0 0 0 0 ACR 0 = 1 | bsent/Not Observed 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observed unisms), 3= Abunds | ed, 1 | Slim Mac Fish = R | roin are | (1-3 | or | ganisms), 2 = Cor 4 = Dominant (> | 0 0 0 | (3-9 gani | 2 2 2 2 isms | 3 3 3 | 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA | abui | nda | OF | : 0 MA | 0 0 0 0 CR 0 = 1 | bsent/Not Observed 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda | ed, 1 ant (> | Slim Mac Fish = R 10 o | are rga | (1-3 nisn | or orns), | ganisms), 2 = Cor 4 = Dominant (> | 0 0 0 nmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 | 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa | ATIO abui | NS nda | OF nce | 3 3 | 0 0 0 ACR 0 = A 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera | ed, 1 ant (> | Slim Mac Fish = R | are rga | (1-3 nism | orns), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 isms | 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes | ATIO abu | NS nda | OF nce | MA: 3 3 3 3 | 0 0 0 ACR 0 = 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunds Anisoptera Zygoptera Hemiptera | ed, 1 ant (> | Slim Mac Fish R 10 o | are rga | (1-3 nism 3 3 | 3 or ns), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria | ATIO abus | NS nda | OF nce | 3 3 3 3 | 0 0 0 ACR 0 = 4 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunds Anisoptera Zygoptera Hemiptera Coleoptera | ed, 1 ont (> | Slim Mac Fish R 10 o | are arga | (1-3 nism 3 3 3 | 3 or ns), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 isms | 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea | ATIO abus | NS nda | OF nee | 3 3 3 3 3 | 0 0 0 ACR 0 = 1 4 4 4 4 4 4 4 | obsent/Not Observed 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera | ed, 1 ont (> | Slim Mac Fish R 10 o | are rga 2 2 2 2 | (1-3 nism | 3 or ns), | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta | ATIO abus | PNS nda | OF ance 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 | 0 0 0 0 ACR 4 4 4 4 4 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae | ed, 1 nnt (> | Slim Mac Fish | are orga | (1-3 nism | 3 or ns), 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda | ATIO abus | NS nda | OF nce 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 | 0 0 0 ACR 0 = . orgs 4 4 4 4 4 4 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunds Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae | ed, 1 nnt (> | Slim Mac Fish - R 10 0 | are rga 2 2 2 2 2 2 2 | (1-3 nism 3 3 3 3 3 3 | 3 or ns), 4 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda | ATIO abus | 1 1 1 1 1 1 | OF ance 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 | 0 0 0 0 ACR 0 = 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae | eed, 1 o o o o o o o o o o o o o o o o o o | Slim: Mac Fish = R 10 o | are organ | (1-3 nism | 3 or ns), 4 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda | ATIO abus | NS nda 1 | 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 | 0 0 0 0 ACR 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae Empididae | 0 0 0 0 0 0 0 | Slim Mac Fish - R 10 0 | are organ | (1-3 nism | 3 or ns), 4 4 4 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda Gastropoda | 0 0 0 0 0 0 0 0 0 | 1 1 1 1 1 1 1 1 | OF nce 2 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 3 | 0 0 0 ACR 0 = 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | Description of Observed 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae Empididae Simuliidae | ed, 1 0 0 0 0 0 0 0 0 | Slim Mac Fish - R 10 o | are rga 2 2 2 2 2 2 2 2 2 2 2 2 | (1-3 nism 3 3 3 3 3 3 3 3 | 3 or ns), 4 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |
| Periphyton Filamentous Algae Macrophytes FIELD OBSERVA Indicate estimated Porifera Hydrozoa Platyhelminthes Turbellaria Hirudinea Oligochaeta Isopoda Amphipoda Decapoda | ATIO abus | NS nda 1 | 2 2 2 2 2 2 2 2 2 | 3 3 3 3 3 3 3 3 | 0 0 0 0 ACR 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | 1 2 3 4 1 2 3 4 1 2 3 4 OBENTHOS Absent/Not Observenisms), 3= Abunda Anisoptera Zygoptera Hemiptera Coleoptera Lepidoptera Sialidae Corydalidae Tipulidae Empididae | 0 0 0 0 0 0 0 | Slim Mac Fish 10 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | are organ | (1-3 nism | 3 or ns), 4 4 4 4 4 4 4 4 4 | ganisms), 2 = Cor 4 = Dominant (>: Chironomidae Ephemeroptera Trichoptera | 0 0 0 mmon 50 or | (3-9 gani | 2 2 2 2 isms | 3 3 3 3 3 3 | 4 4 4 4 |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (FRONT)

| | STREAM NAME Bia | (reeK | LOCATION | v Emac | Rd | | | |
|-----|----------------------------|---|---|---------------------------|-----------------------------|------------------|--------------|-----|
| Ì | | VERMILE | STREAM C | | | | | |
| | LATLC | NG | RIVER BA | SIN | | | | |
| | STORET# | | AGENCY | | | | | |
| | INVESTIGATORS E | | | and 10/13/04 | | | | |
| | FORM COMPLETED BY | | | 112/04 5:00 AM PM | REASON FOR SURVI | EY | | |
| | WEATHER CONDITIONS | Now | | hours | there been a heavy | rain in the last | 7 days? | |
| | | rain shower | n (heavy rain) (steady rain) 's (intermittent cloud cover ear/sunny | ۸ <u>- ۱</u> | r Temperature 17" her | C . | | |
| 2 | SITE LOCATION/MAP | Draw a map of the s | te and indica | te the areas sample | (or attach a photog | aph) | ν€ια | 174 |
| T | FT/SEC | DFLB (PT) | DEATH | YELOCITY FT /SEC | DFLB(FT) | DEPTH (FT) | (FT/SE | |
| • | 0.05 | a | 1.3 | 0.07 | 2.0 | 1.2 | 0.03 | : |
| Ś | 01 | 4 | 2.6 | 0.06 | 4 | 1.5 | 0.00 | |
| | | 6 8 | 3.1 | * | 6 | 1 | | |
| 1 | 0.05 | 0 | 3.3 | 0.05 | 8 | 3.2 | 0.07 | |
| 3 | 80.0 | 10 | 3.3 | 0.09 | 10 | 3.2 | 0.08 | |
| 1 | 0.09 | 12 | 3.1 | 0.06 | 1.2 | 3,0 | 0.08 | |
| - | 0.01 | 14 | 3.0 | | 14 | 3.0 | 0,09 | |
| ١١ | 0.14 | 16 | 2.7 | 0.13 | 16 | 2.8 | 0.10 | - |
| ١ | 0.06 | 18 20 | 2.4 2.0 | 0.06 | 18 | 2.4 | 0.04 | |
| 7 | 6.02 | 22 | 0.9 | 0.02 | 1 22 -1 | BANK | 1 | |
| 3 | 0.10 | 23-BA | NK | i | | | | |
| + | 0.02 | 1 | | | | | | |
| 1 | 0.03 | | | | | | | |
| * 1 | K | | | | | | | |
| | | · | | | | | | |
| | STREAM CHARACTERIZATION | Stream Subsystem Perennial In | termittent 🗅 | St Tidal 🚨 | ream Type Coldwater Warm | water | | |
| | | Stream Origin Glacial Non-glacial monte Swamp and bog | nne Sprin | ng-fed ture of origins | atchment Area | km² | | |

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (BACK)

| WATERSH FEATURE | | Predomi Grest Field/ Agricu Reside | Pasture Industria | cial I | Local Watershed NPS I No evidence Some Obvious sources Local Watershed Erosic None Moderate | potential sources | | |
|---|---------------|--|---|-------------------------------|---|---|--|--|
| RIPARIAN VEGETAT (18 meter b | ION | l | | record the do | | baceous | | |
| INSTREAT FEATURE | | Estimat Samplin Area in Estimat | km² (m²x1000) ed Stream Depth Velocity m | mm²km²km² | Partly open Partly shaded Shaded High Water Mark m Proportion of Reach Represented by Stream Morphology Types Riffle % Run 5 % Channelized Yes No Dam Present Yes No | | | |
| LARGE W DEBRIS | OODY | LWD Density | of LWDm | ²/km² (LWD / 1 | reach area) | | | |
| AQUATIC VEGETAT | | Indicate the dominant type and record the dominant species present Rooted emergent Rooted submergent Rooted floating | | | | | | |
| WATER | UALITY | Temper Specific Dissolve pH Turbidi | cature 60.8° & F Conductance 404, | 16.0°C | Water Odors Normal/None | ured) | | |
| SEDIMENT/ SUBSTRATE Odors Normal Chemical Other Oils | | | nal D Sewage | □ Petroleum □ None te □ Profu | Looking at stones which | Other | | |
| | | | | | | O. C. C. C. C. C. C. C. C. C. C. C. C. C. | | |
| INO | | STRATE add up to 1 | COMPONENTS 100%) | | ORGANIC SUBSTRATE C (does not necessarily add | | | |
| Substrate Type | Diamet | ter | % Composition in Sampling Reach | Substrate Type | Characteristic | % Composition in Sampling Area | | |
| Bedrock | | | | Detritus | sticks, wood, coarse plant materials (CPOM) | 5 | | |
| Boulder | > 256 mm (10" | <u></u> | 10 | | inatorius (CI OIVI) | | | |
| Cobble | 64-256 mm (2. | 5"-10") | 25 | Muck-Mud | black, very fine organic (FPOM) | | | |
| Gravel | 2-64 mm (0.1" | -2.5") | 32 | | | <u> </u> | | |
| Sand | 0.06-2mm (gri | tty) | 5 | Marl | grey, shell fragments | | | |

Silt

Clay

0.004-0.06 mm

< 0.004 mm (slick)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

| STREAM NAME BIQ Creek | LOCATION Enge Rd |
|------------------------|---------------------------------|
| STATION# 5 RIVERMILE | STREAM CLASS |
| LATLONG | RIVER BASIN |
| STORET# | AGENCY |
| INVESTIGATORS ESB, WGL | |
| FORM COMPLETED BY | DATE 10/12/04 REASON FOR SURVEY |

|) | Habitat | | Condition | Category | |
|--|---|---|---|--|--|
| | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 1. Epifaunal Substrate/ Avallable Cover | Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient). | 30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | 10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking. |
| esch | SCORE 8 | 2000 in 1988 217, 196 | 15-414-4213 (23-4)68 | | |
| Parameters to be evaluated in sampling reach | 2. Pool Substrate Characterization | Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common. | Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. | All mud or clay or sand bottom; little or no root mat; no submerged vegetation. | Hard-pan clay or bedrock; no root mat or vegetation. |
| ited | SCORE !! | 20 200 4 8 9/2-16 | programation ar | | |
| be evalua | 3. Pool Variability | Even mix of large- shallow, large-deep, small-shallow, small- deep pools present. | Majority of pools large- deep; very few shallow. | Shallow pools much more prevalent than deep pools. | Majority of pools small- shallow or pools absent. |
| ters t | SCORE 13 | 2005.19 1805.75 35 | \$15.00,277 (EF) 16310545 | | |
| Parame | 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition. | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools. | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. |
| | score 3 | 20 2 19 182-17 16 | 75.04 730 92 4 [| | State of States |
| | 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | channel and mostly present as standing pools. |
| | SCORE . 15 | 2015/10 20 8 2071/206 | \$150A43033, 12, F1 | (0) (0) (2) | |

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

| | Habitat | | Condition | Category | |
|--|--|--|--|---|---|
| l | Parameter | Optimal | Suboptimal | Marginal | Poor |
| | 6. Channel Alteration | Channelization or dredging absent or minimal; stream with normal pattern. | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. | Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted. | Banks shored with gabion or cement; over 80% of the stream react channelized and disrupted. Instream habitat greatly altered o removed entirely. |
| | SCORE 10 | 20 49 48 17 16 | -15 -14 F-13 (12 -11 -1 | 10 9 7 8 7 5 | 5.4.6.3881 |
| pling reach | 7. Channel Sinuosity | The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.) | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line. | Channel straight; waterway has been channelized for a long distance. |
| sam) | SCORE 3 | 20, 249, 148, 247, 36, | 15 14 (43) 12 11 | 10 9 8 47 6 | |
| ated broader than | 8. Bank Stability (score each bank) | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected. | Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. | Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods. | Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing 60-100% of bank has erosional scars |
| oe evalu | SCORE (LB) SCORE (RB) | Left Bank 10 9 Right Bank 1 10 9 | 8 7 6 8 7 6 | 5 4 4 4 1 3 1 5 1 5 1 4 1 4 1 5 1 5 1 5 1 5 1 5 1 5 | 21.60% |
| Parameters to be evaluated broader than sampling reach | 9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream. | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. | Less than 50% of the streambank surfaces covered by vegetation; disruption of streambar vegetation is very high vegetation has been removed to 5 centimeters or less in average stubble height. |
| | SCORE <u>4</u> (LB) | Left Banks 10 9 | 1.8 2. 7 | 5 (A 12/1030) | 2 (2 (4.2.5)0 |
| | SCORE <u>4</u> (RB) | Right Bank 10 9 | 8 3 2 2 3 | 55 / ABAY 8 | A. P. San Andrews |
| | 10. Riparian Vegetative Zone Width (score each bank riparian zone) | Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. | Width of inparian zone 6- 12 meters; human activities have impacted zone a great deal. | Width of riparian zone <6 meters: little or no riparian vegetation due to human activities. |
| | SCORE _ (LB) | Left Bank 10 +9 | 8 7 s 6 s | - 5 4 7 vs. v | 1.2 () () () () () |
| | SCORE (RB) | Right Bank - 10 9 | 8 2 7 6 | 5 8 4 1 \$ 1 | 2 . 1/25, 12.02 |

Total Score 77

| River Code: | RM: | Stream: | | Creek | | | |
|--|-------------------------------------|---------------------------------------|---------------|-------------------------------|-------------|--|-----------|
| Date: 10/12/04 | | | 5 | Emac | Rd | | |
| Scorers Full Name | | | | | | | |
| 1] SUBSTRATE (Check | k ONLY Two Subst | trateTYPE BOXES; | ; Estimate | % present | | | |
| TYPE PO | OL RIFFLE | POOL RIFF | | TRATE ORIG | | SUBSTRATE QUALITY | |
| □ □-BLDR /SLBS[10] | 🗖 🗖 -GRA | VEL [7] | _Check ON | E (OR 2 & AV | ERAGE) | Check ONE (OR 2 & AVERAG | E) |
| DD-BOULDER [9] | DD-SAND | | | estone [1] | SILT: | SILT HEAVY [-2] | 0 |
| | <u> 40</u> □ □ BEDF | | -TILL | | | SILT MODERATE [-1] | Substrat |
| □ □-HARDPAN [4] | | | | TLANDS[0] | | -SILT NORMAL [0] | |
| MUCK [2] | A LO NOTE: Igner | FICIAL[0] e Sludge Originating | _ | DPAN [0] | | SILT FREE [1] | |
| SILT [2] | NOTE: Ignor From Point S | Sources | | | - | ED A EXTENSIVE [-2] | Max 20 |
| | | | | RAP [0] | NESS: | -MODERATE [-1] | |
| NUMBER OF SUBSTRATI (High Quality Only, Score | - X | <u>More</u> [2] Less [0] | ☐ -SHA | USTRINE [0] | • | ☐ -NORMAL [0] ☐ -NONE [1] | |
| | COUNTY LEES OF | ress [o] | | LE [-1] L FINES [-2]_ | | H-MONE [1] | |
| COMMENTS | (Give each cover | type a score of 0 ty | | | | AMOUNT: (Check ONLY One | or |
| (Structure) | | Score All That Occur | | ack for insur | icaons, | check 2 and AVERAGE) | Cover |
| UNDERCUT BANKS [1] | | POOLS> 70 cm [2] | | BOWS, BACKW | ATERS [1] | - EXTENSIVE > 75% [11] | |
| OVERHANGING VEGE | • | ROOTWADS [1] | | JATIC MACROF | | ☐ - MODERATE 25-75% [7] | 10 |
| SHALLOWS (IN SLOW | | BOULDERS [1] | | S OR WOODY | | SPARSE 5-25% [3] | Max 20 |
| ROOTMATS [1] C | | | | | | - NEARLY ABSENT < 5%[1] | |
| 3] CHANNEL MORPH | | NLY One PER Ca | tegory Of | R check 2 an | dAVERAG | | • |
| - | • | CHANNELIZATION | STABI | | | TONS/OTHER | Channe |
| 🗖 - HIGH [4] | I - EXCELLENT [7] | ☐ - NONE [6] | □- н | IGH [3] | □ - SNAGG | SING - IMPOUND. | |
| | I - GOOD [5] | - RECOVERED [4] | | ODERATE [2] | | | |
| | | RECOVERING [3 | i] 🎏 - L(| DW [1] | - CANOP | PY REMOVAL 🗖 - LEVEED | Max 20 |
| O · NONE [1] | | - RECENT OR NO |) | • | D - DREDG | • | j |
| | Ĭ | RECOVERY [1] | | | - ONE SI | DE CHANNEL MODIFICATIONS | |
| COMMENTS: | ND DANK 50000 | | | | | A | _ |
| · 4], RIPARIAN ZONE A | ND BANK EROSIC | | | | | | Downstre |
| RIPARIAN WIDTH L R (Per Bank) | D/Moot De | FLOOD PLAIN QU edominant Per Ban | | | er KIPAKIAI | | Riparian |
| ' □ □ - WIDE > 50m [4] | FOREST, | | • | K □-CONSERVAT | ION TILL AG | L R (Per Bank) E [1] D D -NONE/LITTLE [3 | ركاة |
| MDE - MODERATE 10-50n | | R OLD FIELD [2] | | URBAN OR | | | |
| - NARROW 5-10 m [| | MAL, PARK, NEW FIEL | | | | | 11Max 10 |
| VERY NARROW <5 | | | | -MINING/CO | - | | . • • |
| EE-NONE [0] | · · · · · · · · · · · · · · · · · · | • • • • • • • • • • • • • • • • • • • | | | ** | • • | |
| COMMENTS: | | | | | | | |
| | | | | | - | | |
| 5.]POOL/GLIDE AND F | RIFFLE/RUN QUAL | ITY | | | | | Pool/ |
| MAX. DEPTH | MORPHO | | , | | | Y [POOLS & RIFFLES!] | Current |
| (Check 1 ONLY!) | | 2 & AVERAGE) | | | | That Apply) | |
| >1m [6] | | RIFFLE WIDTH [2] | | -EDDIES[1] | | -TORRENTIAL[-1] | 9 |
| □ - 0.7-1m [4] | | RIFFLE WIDTH [1] | | □-FAST[1] | | -INTERSTITIAL[-1] | Max 12 |
| □ - 0.4-0.7m [2] | -POOL WIDTH | KIFFLE W. [0] | | -MODERATE | | -INTERMITTENT[-2] | |
| □ - 0.2- 0.4m [1] | COMMENTS: | | | -SLOW [1] | | -VERY FAST[1] | |
| - < 0.2m [POOL=0] | COMMENTS: | | - | | | | |
| | | CHECK ONE | | TK 2 AND A | VEDAGE | • | Riffle/Ru |
| RIFFLE DEPTH | RUN DEF | CHECK ONE | | SUBSTRATE | | RIFFLE/RUN EMBEDDEDNESS | |
| Best Areas >10 cm | | | | ,Cobble, Bo | | II - NONE [2] | |
| D - Best Areas 5-10 cm | •• 🛥 | / | | ,cobble, bol E (e.g.,Large | | | Max 8 |
| Best Areas < 5 cm | | | | ine Gravel,S | | D - MODERATE [0] | Gradier |
| [RIFFLE=0] | | □ :010 | - : WALL () | ine diaretja | , [o] | EXTENSIVE [-1] | Cadio |
| COMMENTS: | • | | | | NO RIFFLE | | 6 |
| | | | | | | · · · · · · · · · · · · · · · · · · · | |
| 6] GRADIENT (ft/mi): | DRAINAC | SE AREA (sa.mi.) | 78.1 | %P0 | DOL: 9 | 3 %GLIDE: | Max 10 |
| of organization (million | | · · · (54.1.11) | <u>-</u> | | FFLE: | | |
| ** Best areas must be large enough to | support a population of riffle-o | bligate species | | 701 (1 | <u> </u> | | |

Macrobenthos Qualitative Sample List

| 21 | | | | 005050 | COUNT | TO EDANCE VALUE | EDI | |
|---|---|--|--|--|--|---|---|---|
| | ORDER | FAMILY | GENUS | SPECIES | COUNT | TOLERANCE VALUES | | D |
| | Nematomorpha | | | | | | 0.000 | Parasite |
| - 11 | Hydracarina- Trombidiformes | | | | | | 0.000 | Predators/Parasite |
| | | Planaria | | | 2 | 4 | 0.084 | Omnivore |
| | | Spongillidae | | | | | 0.000 | Filters |
| | | | Corbicula | fluminea | 2 | 3.2 | 0.067 | |
| 31[| | | Corbicula | | | J.2 | | |
| | | | | polymorpha | | | 0.000 | |
| | , I | Unionidae | Villosa | iris | | | 0.000 | |
| 18 | | Sphaeriidae | | | | 8 | 0.000 | |
| | | | | | | 6 | | Scrapers |
| | | Ancylidae | | | | | | |
| 20 | | Lymnaeidae | | | 6 | 6.9 | 0.436 | Scrapers |
| Г | | Lymnaeidae | Fossaria | | | 6 | 0.000 | Scrapers |
| 19 | | Physidae | | | 3 | 8 | 0.253 | Scrapers |
| , · · · | | Physidae | Physella | | | В | | Scrapers |
| , | | riiyadae | r riyaana | | | 7 | | Scrapers |
| | | Planorbidae | | | | | | |
| L | | Planorbidae | Planorbula | | | 7 | | Scrapers |
| - 1 | | Pleuroceridae | | | | | 0.000 | Scrapers |
| 1 | | Bithyniidae | Bithynia | tentaculata | | | 0.000 | Scrapers |
| | Annelida | Hirudinea | | | 1 | 10 | 0.105 | Gathers |
| 25 | AIIIIONA | | | | 4 | | | Gathers |
| | | Oligochaeta | | | 7 | 8 | | Predators |
| 26 | Decapoda | | | | | | | |
| 17 | Amphipoda | l | | | | 4 | | Shredders |
| 24 | Isopoda | Asellidae | | 1 | | 8 | | Shredders |
| - 1 | Ostracoda | | | | | . 8 | 0.000 | Scavengers |
| | | Casaidas | | _ | | 7 | | Gathers |
| | Ephemeroptera | Caenidae | | | | 3.1 | | Gathers |
| 13 | | Caenidae | Caenis | | 5 | | | |
| Ī | | Ephemeridae | Hexagenia | | | 3.6 | | Gathers |
| 15 | | Baetidae | Baetis | T | 1 | 3.1 | 0.000 | Gathers |
| - 1 | | Baetidae | Baetis | brunneicolor | | 4 | 0.000 | Gathers |
| - 1 | | Baetidae | Baetis | intercalaris | | 2.7 | | Gathers |
| - 1 | | | | | t- | 5.6 | | Gathers |
| ļ | | Baetidae | Callibaetis | | | | | |
| 14 | | Heptageniidae | Stenacron | | 1 | 3.1 | | Scrapers |
| | | Heptageniidae | Stenacron | gildersleevei | | 3.1 | 0.000 | Scrapers |
| | | Heptageniidae | Stenonema | ı — — — | 1 | 4 | 0.000 | Scrapers |
| | | | Stenonema | exiguum | 1 | 1.9 | 0.000 | |
| | | Heptageniidae | | V-Muuni | | 2 | | |
| | | Isonychiidae | Isonychia | | | | | Filters |
| | | Leptohyphidae | Tricorythodes | | | 2.7 | | Gathers |
| | | Siphlonuridae | | | | 7 | | Gathers |
| | | Ephemerellidae | Timpanoga | | T | 1 | | Gathers |
| | | Leptophlebiidae | | | 1 | 2 | | Gathers |
| | | | | | | | | |
| | Coleoptera | Dytiscidae | | | 4 | 5 | | Predators |
| 37 | | Gyrinidae | | | 2 | 5 | 0,105 | Predators |
| | | Gyrinidae | Dineutus | | | 3.7 | 0.000 | Predators |
| 27,33 | | Haliplidae | | | 2 | 7 | 0.147 | Predators |
| | | | | | | 5 | | Predators |
| | · · · · · · · · · · · · · · · · · · · | Dryopidae | | - | | | | |
| 28,32 | | Elmidae | | | 9 | 4 | | Gathers |
| | | Psephenidae | Psephenus | | | 4 | | Scrapers |
| | | Hydrophiloidae | | | | l | 0.000 | Gathers |
| 7 | | Hydrophiloidae | Tropisternus | | 1 | | 0.000 | Gathers |
| | Megaloptera | Sialidae | | | † · | 4 | 0.000 | Predators |
| | Magacotora | Corydalidae | Corydakus | | | 4 | 0.000 | Predators |
| | | Corydaidae | | · · · · · · · | | | | |
| | Trichoptera | Brachycentridae | Brachycentrus | | | 1 1 | | Filters |
| | | Helicopsychidae | Helicopsyche | | | 3 | 0.000 | Scrapers |
| | | Helicopsychidae | Helicopsyche | borealis | | 3 | 0.000 | Scrapers |
| 16 | | Hydropsychidae | | 1 | | 4 | | Filters |
| | | | Hadroneunhe | | | 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | | | | | |
| | | Hydropsychidae | Hydropsyche | betteni | 1 | 4 | | Filters |
| | | Hydropsychidae | Hydropsyche | scalaris | | 4 | | Filters |
| | | Hydropsychidae | Symphitopsyche | | | 4 | 0.000 | Filters |
| | | Hydroptilidae | 1 | | | 4 | | Gathers |
| | | | Ukudanasila | | | 3.2 | | |
| | | Hydroptilidae | Hydroptila | | | | 0.000 | Gathers |
| | | Leptoceridae | | | 1 | 4 | | Shredders |
| | | Leptoceridae | Nectopsyche | | 1 | 4 | 0.000 | Shredders |
| | | Molannidae | 1 | 1 | 1 | 6 | 0.000 | Gathers |
| | | Philopotamidae | 1 | | 1 | 3 | | Filters |
| | | | Hagapalic | | | 4 | | Shredders |
| | | Phryganeidae | Hagenella | + | + | | | |
| | | Polycentropodidae | Cyrnellus | ļ | | 6 | | Filters |
| | | Psychomyiidae | Lype | | | 2 | 0.000 | Gathers |
| 36 | Hemiptera | Belostomatidae | | I | 1 | | 0.000 | Predators |
| | | Belostomatidae | Belostoma | T | 1 | I | | Predators |
| 34 | | Corixidae | 1 | | 3 | 10 | | Predators |
| | | | | | | | | |
| - | | Gerridae | - | | 2 | 5 | | Predators |
| 3 | | Gerridae | Trepobates | 1 | 1 | 5 | | Predators |
| 3 | | | | | | | 1 0000 | Predators |
| 3 | | Notonectidae | Notonecta | | | | 0.000 | |
| 3 | | Notonectidae | | | | | 0.000 | Predators |
| 3 | | Notonectidae Nepidae | Notonecta | | | | 0.000 | Predators |
| 3 | Disconters | Notonectidae Nepidae Nepidae | Notonecta Ranatra | | | 1 | 0.000 | Predators Predators |
| 3 | Piecoptera | Notonectidae Nepidae Nepidae Periidae | Ranatra Perlesta | | | 1 | 0.000 | Predators Predators Predators |
| | Plecoptera | Notonectidae Nepidae Nepidae Peridae Peridae | Notonecta Ranatra | | | 1 | 0.000 0.000 0.000 | Predators Predators Predators Predators |
| | | Notonectidae Nepidae Nopidae Periidae Periidae Chloroperiidae | Ranatra Perlesta | | | 1 | 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators |
| | Piecoptera Odonata-Anisoptera | Notonectidae Nepidae Nopidae Periidae Periidae Chloroperiidae | Ranatra Perlesta | | | 1 | 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators |
| | | Notonectidae Nepidae Nepidae Peridae Peridae | Ranatra Perlesta | | | 1 | 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators |
| | | Notonectidae Nepidae Nepidae Peridae Peridae Chioroperidae Aashnidae Aeshnidae | Ranatra Perlesta | | | 1 1 3 3 | 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators |
| 3 | | Notonectidae Nepidae Nepidae Peridae Peridae Chioroperidae Aashnidae Gomphidae | Ranatra Perlesta | | | 1 1 3 3 | 0.000 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
| | Odonata-Anisoptera | Notonectidae Nepidae Nepidae Periidae Periidae Cohoroperiidae Aeshnidae Aeshnidae Gomphidae Cordulegastridae | Ranatra Perlesta | | | 1 1 3 3 1 1 3 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
| | Odonata-Anisoptera | Notonecidae Nepidae Nepidae Peridae Peridae Chioroperidae Aeshnidae Aeshnidae Gomphidae Cordulegastridae Cordulidae | Ranatra Perlesta | | | 1 1 3 3 1 3 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
| | Odonata-Anisoptera | Notonectidae Nepidae Nepidae Periidae Periidae Cohoroperiidae Aeshnidae Aeshnidae Gomphidae Cordulegastridae | Ranatra Perlesta | | | 1 1 3 3 1 1 3 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
| | Odonata-Anisoptera | Notonectidae Nepidae Nepidae Peridae Peridae Peridae Choroperidae Aeshnidae Aeshnidae Cordulegastridae Cordulegastridae Cordulegastridae Lbellulidae | Ranatra Perlesta | | | 1 1 3 3 1 3 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators Predators |
| | Odonata-Anisoptera | Notonecidae Nepidae Peridae Peridae Peridae Chioroperidae Aeshnidae Gomphidae Cordulegastridae Cordulegastridae Loelluidae Loelluidae | Ranatra Periesta Neoperia Boyeria | | | 1 1 3 3 3 1 3 5 9 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators |
| . 22 | Odonata-Anisoptera Cdonata-Zygoptera | Notonectidae Nepidae Nepidae Peridae Peridae Peridae Chioroperidae Aeshnidae Gomphidae Cordulegastridae Cordulidae Lbellulidae Calopterygidae Calopterygidae | Ranatra Perlesta | | | 1 1 3 3 3 1 3 5 9 5 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators |
| . 22 | Odonata-Anisoptera Cdonata-Zygoptera | Notonecidae Nepidae Peridae Peridae Peridae Choroperidae Asshnidae Asshnidae Gomphidae Cordulegastridae Libelluidae Libelluidae Calopterygidae Calopterygidae Coenagnonidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 14 | 1 1 3 3 3 1 1 3 5 5 9 5 5 3.7 6.1 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators |
| 22 4 6 5 | Odonata-Anisoptera Odonata-Zygoptera | Notonectidae Nepidae Nepidae Peridae Peridae Peridae Chioroperidae Aeshnidae Gomphidae Cordulegastridae Cordulidae Lbellulidae Calopterygidae Calopterygidae | Ranatra Periesta Neoperia Boyeria | | 2 | 1 1 3 3 3 1 1 3 5 5 9 5 5 3 7 1 6.1 5.1 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators |
| . 22 | Odonata-Anisoptera Odonata-Zygoptera | Notonecidae Nepidae Nepidae Peridae Peridae Peridae Chioroperidae Asshnidae Asshnidae Comphidae Cordulidae Libelulidae Calopterygridae Calopterygridae Coenagronidae Coenagronidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | | 1 1 3 3 3 1 1 3 5 5 9 5 5 3.7 6.1 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators |
| 22 4 6 5 | Odonata-Anisoptera Odonata-Zygoptera | Notonecidae Nepidae Peridae Peridae Chroroperidae Aselmidae Aselmidae Aselmidae Cordulegastridae Cordulegastridae Libelluidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 2 | 1 1 3 3 1 1 3 5 9 5 5 3.7 6.1 5.1 | 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 | Predators |
| 22 4 6 5 | Odonata-Anisoptera Odonata-Zygoptera | Notonecidae Nepidae Peridae Peridae Peridae Peridae Peridae Chioroperidae Asshnidae Asshnidae Gomphidae Cordulidae Libealuidae Calopterygdae Calopterygdae Calopterygdae Coenagronidae Coenagronidae Coenagronidae Coenagronidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 2 | 1 1 3 3 1 1 3 5 9 5 5 9 5 6,1 5,1 9 | 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C 0.00C | Predators |
| 22 4 6 5 30 | Odonata-Anisoptera Odonata-Zygoptera Diptera | Notonectidae Nepidae Nepidae Peridae Peridae Peridae Peridae Chioroperidae Aeshnidae Gomphidae Cordulegastridae Cordulegastridae Cordulegastridae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Lestidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 10 | 1 1 3 3 3 1 1 1 3 3 5 5 9 9 5 5 3 7 6 1 1 9 9 9 5 7 7 | 0.000 | Predators |
| 22 4 6 5 30 | Odonata-Anisoptera Cidonata-Zygoptera Diptera | Notonecidae Nepidae Peridae Peridae Peridae Peridae Peridae Aeshnidae Aeshnidae Gomphidae Corduliae Lbelluldae Calopterygidae Calopterygidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Coenagrionidae Estidae Certabopoginidae Gertabopoginidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 10 | 1 1 3 3 3 1 1 3 3 5 5 9 5 5 5 9 9 5 7 8.11 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.000000 | Predators Gamers Gamers Gamers Gamers |
| 22 4 6 5 30 | Odonata-Anisoptera Cidonata-Zygoptera Diptera | Notonectidae Nepidae Nepidae Peridae Peridae Peridae Peridae Chioroperidae Aeshnidae Gomphidae Cordulegastridae Cordulegastridae Cordulegastridae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Coenagronidae Lestidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 10 | 1 1 3 3 3 1 1 1 3 3 5 5 9 9 5 5 3 7 6 1 1 9 9 9 5 7 7 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.000000 | Predators |
| 22 4 6 5 30 | Odonata-Anisoptera Odonata-Zygoptera Diptera | Notonectidae Nepidae Nepidae Peridae Peridae Peridae Chioroperidae Aeshnidae Aeshnidae Gomphidae Cordulegastridae Cordulegastridae Cordulegastridae Calopterygidae Calopterygidae Coenagronidae | Ranatra Periesta Neoperia Boyeria Caloptery. | | 10 | 1 1 3 3 3 1 1 3 3 5 5 9 5 5 5 9 9 5 7 8.11 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Predators Gathers Gathers Gathers Gathers |
| 22 4 6 5 30 11 12 35 | Odonata-Anisoptera Codonata-Zygoptera Diptera | Notonecidae Nepidae Peridae Pe | Notonecta Ranatra Periesta Neoperia Boyeria Caloptery. Argis | | 10 | 1 1 3 3 3 1 1 3 3 5 5 9 5 5 5 3 3 7 6 1 1 5 1 9 9 9 5 7 7 8 1 1 6 6 8 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.000000 | Predators Gathers Gathers Gathers Gathers Gathers Gathers Gathers Gathers |
| 22 4 6 5 30 11 12 35 | Odonata-Anisoptera Odonata-Zygoptera Diptera | Notonecidae Nepidae Nepidae Peridae Peridae Peridae Chioroperidae Aeshnidae Aeshnidae Gomphidae Cordulisdae Loeluldae Loeluldae Loeluldae Calopterygdae Coenagronidae Coen | Notonecta Ranatra Periesta Neoperia Boyeria Caloptery. Argis | | 10 | 1 1 3 3 3 3 1 1 3 3 5 5 9 9 5 5 7 8 1 1 6 6 8 6 6 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.000000 | Predators Pred |
| 22 4 6 5 30 11 12 12 35 | Odonata-Anisoptera Odonata-Zygoptera Diptera | Notonecidae Nepidae Peridae Nepidae Peridae Peridae Choroperidae Aeshnidae Gomphidae Gomphidae Cordulidae Lbelluidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Lestidae Lestidae Lestidae Coenagronidae Coenagronidae Soenagronidae Lestidae Coenagronidae Soenagronidae Lestidae Coenagronidae Soenagronidae Simulidae | Notonecta Ranatra Periesta Neoperia Boyeria Caloptery. Argis | | 10 | 1 1 3 3 3 3 1 1 3 3 5 5 9 5 5 5 3 7 6 1 1 5 5 7 8 1 6 6 8 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.000000 | Predators Qathers 2 4 6 5 30 11 12 35 | Odonata-Anisoptera Odonata-Zygoptera Diptera | Notonecidae Nepidae Nepidae Peridae Peridae Peridae Chioroperidae Asshnidae Asshnidae Gomphidae Cordulidae Libelulidae Calopterygidae Calopterygidae Congaronidae | Notonecta Ranatra Periesta Neoperia Boyeria Caloptery. Argis | | 10 | 1 1 3 3 3 3 1 1 3 3 5 5 9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 6 6 1 6 5 1 6 6 6 6 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Predators Gathers Gathers Shredders Predators Shredders Predators Gathers Gathers Gathers Gathers Gathers |
| 22 4 6 5 30 11 12 35 | Odonata-Anisoptera Cidonata-Zygoptera Diptera | Notonecidae Nepidae Peridae Nepidae Peridae Peridae Choroperidae Aeshnidae Gomphidae Gomphidae Cordulidae Lbelluidae Calopterygidae Calopterygidae Coenagronidae Coenagronidae Lestidae Lestidae Lestidae Coenagronidae Coenagronidae Soenagronidae Lestidae Coenagronidae Soenagronidae Lestidae Coenagronidae Soenagronidae Simulidae | Notonecta Ranatra Periesta Neoperia Boyeria Caloptery. Argis | | 10 | 1 1 3 3 3 3 1 1 3 3 5 5 9 5 5 5 3 7 6 1 1 5 5 7 8 1 6 6 8 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 | 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 | Predators Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Gradiers Filters |

| TAXA RICHNESS | 19 |
|---------------------------------|-------|
| FBI | 6.381 |
| Scraper/Filter | 4.500 |
| EPT/Chironomidae | 0.179 |
| % Contribution of Dominant Taxa | 0.150 |
| EPT Index | 1.000 |
| Community Similarity Indices | 0.474 |
| , , | 0.179 |
| CPOM | 0.000 |
| Total Number Collected | 100 |

Comm. Loss = 0.474 Jaccard Coef. = 0.179

total shredders

0

A DDELLED BY BE

MACROINVERTEBRATE VOUCHER SPECIMENS

APPENDIX II:

PURDUE

Department of Entomology

8 Mar 2005

Walter Levernier V3 Companies of Illinois Ltd. 7325 Janes Avenue Woodridge, IL 60517

Dear Dr. Levernier,

Thank you for depositing in PERC voucher specimen from the Barr Creek Watershed Post-Construction Monitoring Study. The specimens arrived in good condition. I have examined them, and within my own level of expertise, find all of the identifications to be accurate.

We appreciate the deposition of materials here, and look forward to continued cooperation in the future.

Sincerely.

Arwin Provonsha Curator of Collections



visio vertere virtute

February 21, 2005

Dr. Arwin Provonsha
Department of Entomolgy
901 W. State Street
West Lafayette, IN 47907-2089

Re: Invertebrate Voucher Specimens

Barr Creek, Vanderburgh and Posey Counties, Indiana

Dear Dr. Provonsha:

Enclosed you will find thirty-seven (37) representative macroinvertebrate specimens, in individually labeled vials, and photo-documentation of each. This voucher collection is being submitted to Purdue University Department of Entomology as part of the Barr Creek Watershed Post-Construction Monitoring Study. This project is being done for the Vanderburgh County Soil and Water Conservation District and the Indiana Department of Natural Resources through the Lake and River Enhancement (LARE) program. Please verify these specimens for us.

Please contact me at 630-724-9200 ext. 126, if you have any questions or concerns. Thank you very much.

Very truly yours,

V3 CONSULTANTS, LTD.

Walter Levernier

Ecologist

Edward J Belmonte

Senior Ecologist/Project Manager

WGL/ch

Attachments

cc: Amy Steeples, IDNR

Cecil Rich, IDNR

V3 File



Barr Creek Post-Construction Monitoring Study Photo 1 Vial No. 1

12/7/04

Class: Hirudinea

Spring Station 1 Fall Station 1,5

Barr Creek Post-Construction Monitoring Study Photo 2 Vial No. 2

12/7/04

Family: Tipulidae

Spring Station 1,2 Fall Station 1

Barr Creek Post-Construction Monitoring Study Photo 3 Vial No. 3

12/7/04

Family: Gerridae

Spring Station 1,2 Fall Station 2,4,5



Barr Creek Post-Construction Monitoring Study

Photo 4 Vial No. 4

12/7/04

Calipterygidae Calopteryx sp.

Spring Station 1,5 Fall Station 1



Barr Creek Post-Construction Monitoring Study

Photo 5 Vial No. 5

12/7/04

Coenagrionidae Argia sp.

Spring Station 1,2,3,4 Fall Station 2,4,5

Barr Creek Post-Construction Monitoring Study Photo 6 Vial No. 6

12/7/04

Family: *Coenagrionidae*

Spring Station 1,3,4,5 Fall Station 3,5



Barr Creek Post-Construction Monitoring Study Photo 7 Vial No. 7

12/7/04

Hydrophilidae Tropisternus sp.

Spring Station 1,2 Fall Station 2,3



Barr Creek Post-Construction Monitoring Study Photo 8 Vial No. 8

12/7/04

Family: Dytiscidae

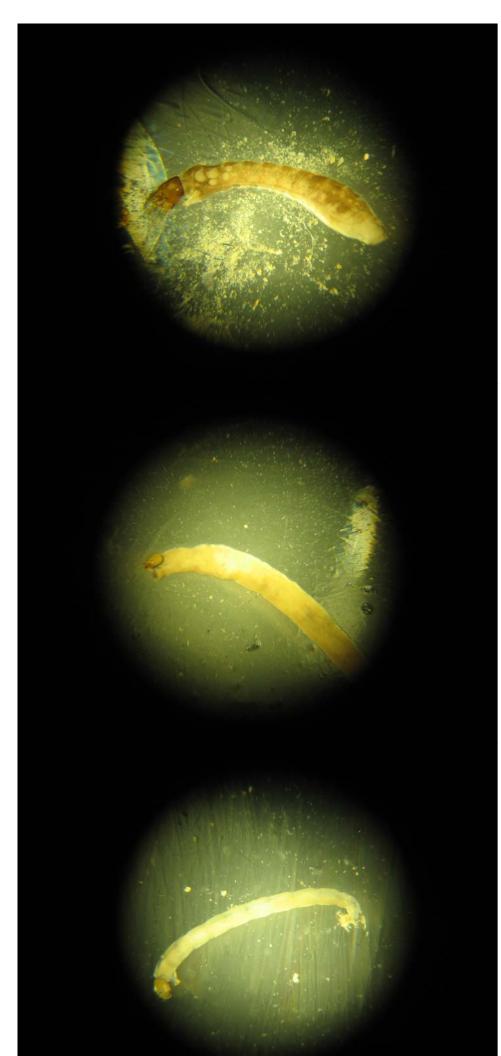
Spring Station 1,3,4 Fall Station 4,5

Barr Creek Post-Construction Monitoring Study Photo 9 Vial No. 9

12/7/04

Family: Dytiscidae

Spring Station 1



Barr Creek Post-Construction Monitoring Study Photo 10 Vial No. 10

12/7/04

Family: Simuliidae

Spring Station 1,2,3,4,5

Fall Station 1

Barr Creek Post-Construction Monitoring Study Photo 11 Vial No. 11

12/7/04

Family: "Red" *Chironomidae*

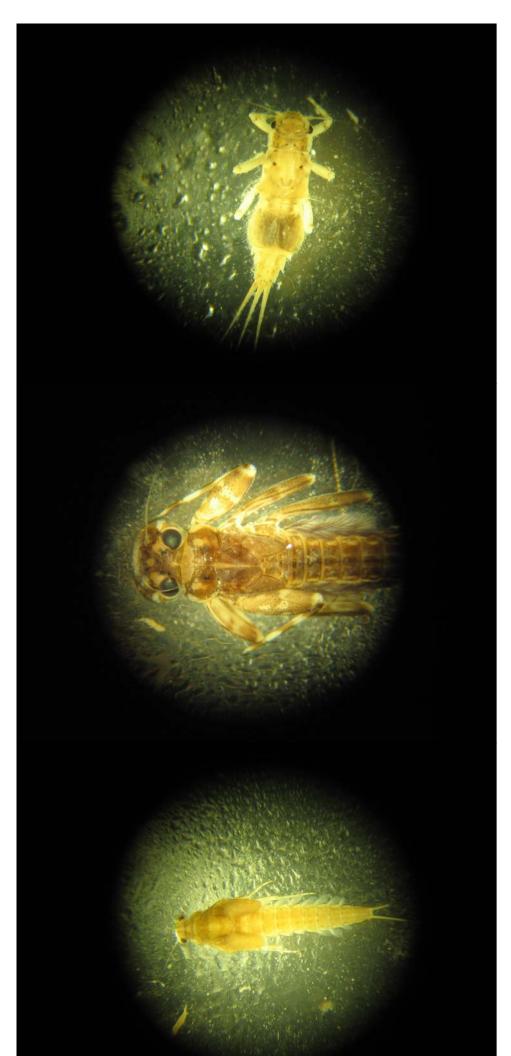
Spring Station 1,2,3,4,5 Fall Station 1,2,3,4,5

Barr Creek Post-Construction Monitoring Study Photo 12 Vial No. 12

12/7/04

Family: Chironomidae

Spring Station 1,2,3,4,5 Fall Station 1,3,4,5



Barr Creek Post-Construction Monitoring Study Photo 13 Vial No. 13

12/7/04

Caenidae Caenis sp.

Spring Station 1,2,3,4,5 Fall Station 4,5

Barr Creek Post-Construction Monitoring Study Photo 14 Vial No. 14

12/7/04

Heptageniidae Stenacron sp.

Spring Station 1,2,3

Barr Creek Post-Construction Monitoring Study Photo 15 Vial No. 15

12/7/04

Baetidae Baetis sp.

Spring Station 1,2,4,5 Fall Station 1,2



Barr Creek Post-Construction Monitoring Study Photo 16 Vial No. 16

12/7/04

Family: *Hydropsychidae*

Spring Station 1,4,5 Fall Station 1

Barr Creek Post-Construction Monitoring Study Photo 17 Vial No. 17

12/7/04

Order: Amphipoda

Spring Station 1,2,3,4,5 Fall Station 1,2

Barr Creek Post-Construction Monitoring Study Photo 18 Vial No. 18

12/7/04

Family: Sphaeriidae

Spring Station 1,2 Fall Station 1



Barr Creek Post-Construction Monitoring Study Photo 19 Vial No. 19

12/7/04

Family: Physidae

Spring Station 1,2,3,4,5 Fall Station 2,3,4,5

Barr Creek Post-Construction Monitoring Study Photo 20 Vial No. 20

12/7/04

Family: Lymnaeidae

Spring Station 1 Fall Station 1,4,5

Barr Creek Post-Construction Monitoring Study Photo 21 Vial No. 21

12/10/04

Phylum: Nematomorpha

Spring Station 2,4,5 Fall Station 3,4,5

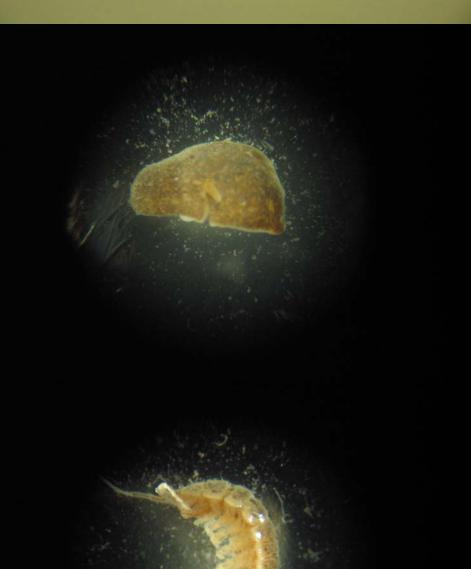


Barr Creek Post-Construction Monitoring Study Photo 22 Vial No. 22

12/10/04

Family: Corduliidae

Spring Station 2,3,4,5 Fall Station 2,3,4



Barr Creek Post-Construction Monitoring Study Photo 23 Vial No. 23

12/10/04

Class: Turbellaria

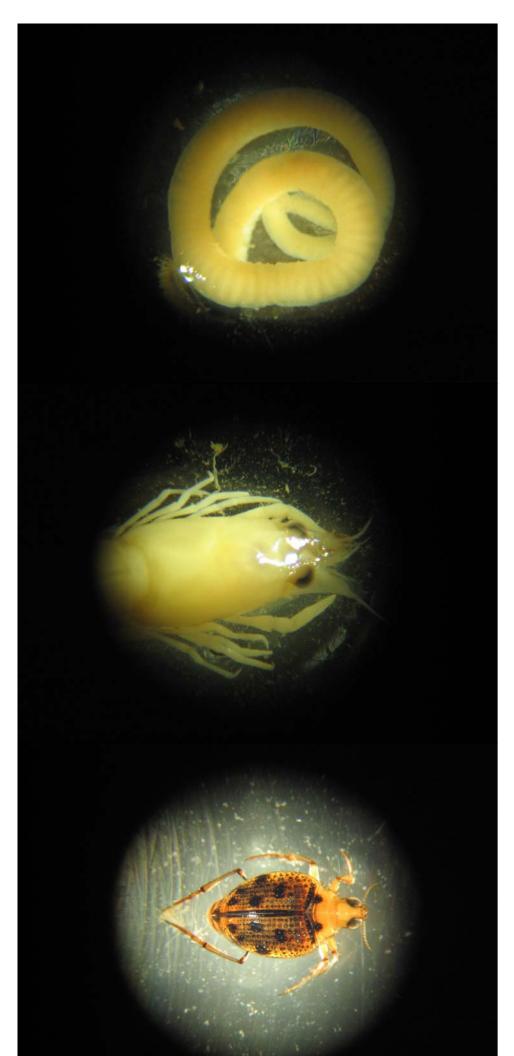
Spring Station 1,2,4,5 Fall Station 1,3,4,5

Barr Creek Post-Construction Monitoring Study Photo 24 Vial No. 24

12/10/04

Isopoda Asellidae sp.

Spring Station 2,3,4 Fall Station 1



Barr Creek Post-Construction Monitoring Study Photo 25 Vial No. 25

12/10/04

Class: Oligochaeta

Spring Station 1,2,3,4,5 Fall Station 2,4,5

Barr Creek Post-Construction Monitoring Study Photo 26 Vial No. 26

12/10/04

Order: Decapoda

Spring Station 2,3

Barr Creek Post-Construction Monitoring Study Photo 27 Vial No. 27

12/10/04

Family: Haliplidae

Spring Station 2,3,4 Fall Station 2,3,5



Barr Creek Post-Construction Monitoring Study Photo 28 Vial No. 28

12/10/04

Family: Elmidae

Spring Station 2,5 Fall Station 2,3

Barr Creek Post-Construction Monitoring Study Photo 29 Vial No. 29

12/10/04

Family: Tabanidae

Spring Station 2,3

Barr Creek Post-Construction Monitoring Study Photo 30 Vial No. 30

12/10/04

Coenagrionidae Engallagma sp.

Spring Station 3 Fall Station 1,2,5



Barr Creek Post-Construction Monitoring Study Photo 31 Vial No. 31

12/10/04

Corbiculidae Corbicula fluminea

Spring Station 3,4,5 Fall Station 2,4,5



Barr Creek Post-Construction Monitoring Study Photo 32 Vial No. 32

12/13/04

Family: Elmidae

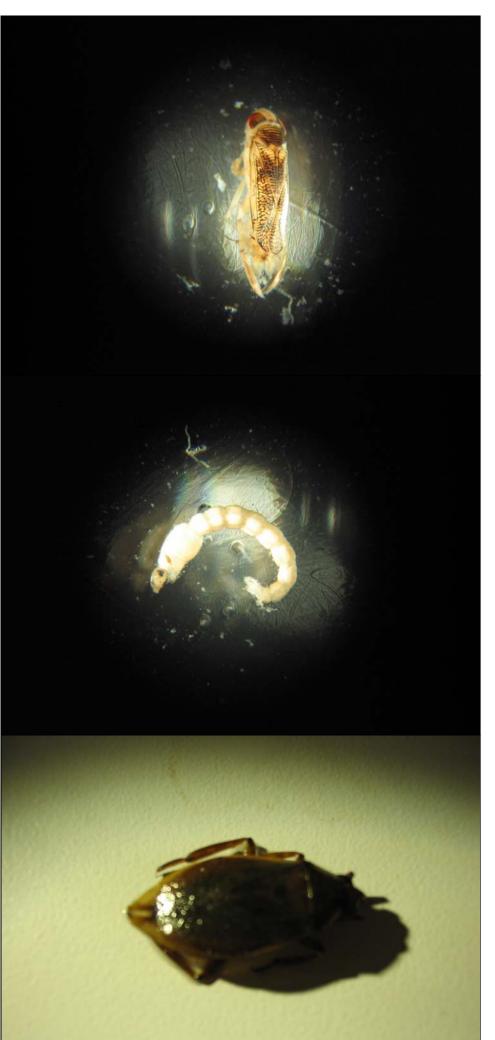
Spring Station 5

Barr Creek Post-Construction Monitoring Study Photo 33 Vial No. 33

12/13/04

Family: Haliplidae

Fall Station 1,2,3,4,5



Barr Creek Post-Construction Monitoring Study Photo 34 Vial No. 34

12/13/04

Family: Corixidae

Fall Station 2,3,5

Barr Creek Post-Construction Monitoring Study Photo 35 Vial No. 35

12/13/04

Family: Culicidae

Fall Station 2,3,4

Barr Creek Post-Construction Monitoring Study Photo 36 Vial No. 36

12/13/04

Family: *Belostomatidae*

Fall Station 5



Barr Creek Post-Construction Monitoring Study Photo 37 Vial No. 37

12/13/04

Family: Gyrinidae

Fall Station 5

APPENDIX III:

STATION PHOTOGRAPHS



Spring 4/27/04

Station 1 Rush Creek water quality and macroinvertebrate study location. Facing upstream.



Spring 4/27/04

Station 1 Rush Creek water quality and macroinvertebrate study location. Facing downstream.



PHOTO 3

Spring 4/28/04

Station 2 Barr Creek water quality and macroinvertebrate study location. Facing upstream.



Spring 4/28/04

Station 2 Barr Creek water quality and macroinvertebrate study location. Facing downstream.



PHOTO 5

Spring 4/29/04

Station 3
Barr Creek water
quality and
macroinvertebrate
study location. Facing
upstream.



PHOTO 6

Spring 4/29/04

Station 3 Barr Creek water quality and macroinvertebrate study location. Facing downstream.



Spring 4/29/04

Station 4 Big Creek water quality and macroinvertebrate study location. Facing upstream.

PHOTO 8

Spring 4/29/04

Station 4
Big Creek water quality and macroinvertebrate study location. Facing downstream.

PHOTO 9

Spring 4/28/04

Station 5 Big Creek water quality and macroinvertebrate study location. Facing upstream.



Spring 4/28/04

Station 5 Big Creek water quality and macroinvertebrate study location. Facing downstream.

PHOTO 11

Fall 10/13/04

Station 1 Rush Creek water quality and macroinvertebrate study location. Facing upstream.

PHOTO 12

Fall 10/13/04

Station 1 Rush Creek water quality and macroinvertebrate study location. Facing downstream.



Fall 10/13/04

Station 2
Barr Creek water
quality and
macroinvertebrate
study location. Facing
upstream.



Fall 10/13/04

Station 2 Barr Creek water quality and macroinvertebrate study location. Facing downstream.

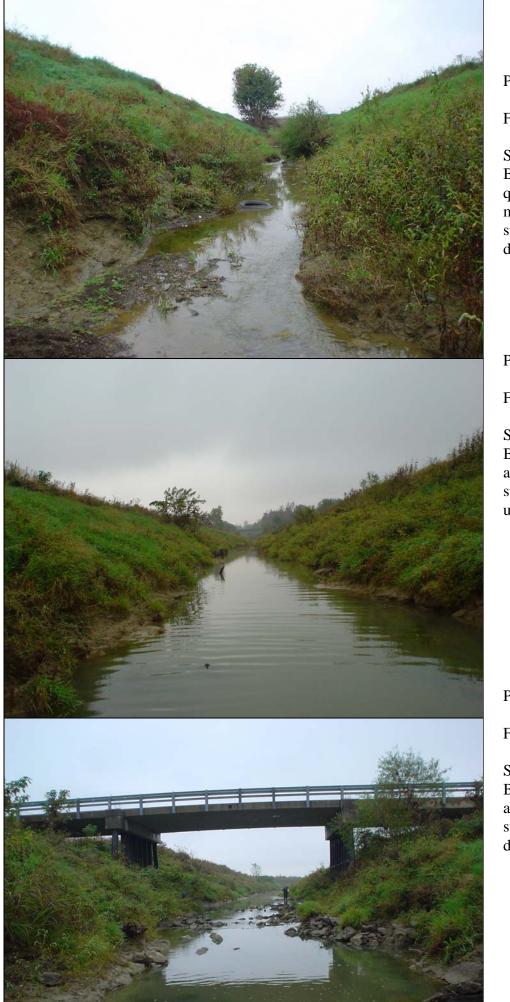


PHOTO 15

Fall 10/13/04

Station 3
Barr Creek water
quality and
macroinvertebrate
study location. Facing
upstream.





Fall 10/13/04

Station 3 Barr Creek water quality and macroinvertebrate study location. Facing downstream.

PHOTO 17

Fall 10/13/04

Station 4 Big Creek water quality and macroinvertebrate study location. Facing upstream.

PHOTO 18

Fall 10/13/04

Station 4
Big Creek water quality
and macroinvertebrate
study location. Facing
downstream.



Fall 10/13/04

Station 5 Big Creek water quality and macroinvertebrate study location. Facing upstream.

PHOTO 20

Fall 10/13/04

Station 5
Big Creek water quality and macroinvertebrate study location. Facing downstream.